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ABSTRACT

Through an analytic technique this monograph studies the economic impact of the ratio of benefits to costs of the vocational rehabilitation process. The primary purpose of the research was to compare the relative value of the rehabilitation for the culturally disadvantaged to that of the medically disabled by benefit-cost analysis. The results of the study confirm the effectiveness of the public rehabilitation process, which can also be effective with the culturally disadvantaged, when the counselor focuses on their vocational adjustment. The present study presents dramatic evidence of the viability of a working plan in which social and rehabilitation service agencies can work together to deal with the problem of cultural disadvantagement. (Previously announced as ED 064 473.) (Author/LM)

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Wisconsin Studies in Vocational Rehabilitation
Monograph XV
Series 2

The Economic Impact of An Expanded Program of Vocational Rehabilitation

George N. Wright
Kenneth W. Reagles

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The University of Wisconsin
Regional Rehabilitation Research Institute
Madison
1971

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Significant Findings for the Rehabilitation Worker

Benefit-Cost Analysis

- benefit-cost analysis is effective in providing information for vocational rehabilitation program planning and budgeting.
- information gained by financial analysis of rehabilitation closures can help counselors to predict the types of cases and services and the interaction effect of these two variables as related to economic considerations.
- vocational rehabilitation services are a good investment for both medically- and culturally-handicapped individuals:
  (a) for every dollar invested in the medically disabled, $25 was returned in increased lifetime earnings;
  (b) for every dollar invested in the culturally (non-medically) handicapped, $70 was returned in increased lifetime earnings; the 225 culturally-handicapped rehabilitants had an increase in projected lifetime earnings totalling over $10,000,000 from services costing less than $150,000 in public funds;
  (c) presumably the cost of rehabilitating the culturally handicapped was less than for the medically handicapped because the former did not need physical restoration services.

Reduction in Public Assistance Expenditures

- many rehabilitation applicants—especially the culturally handicapped—are chronic or frequent welfare recipients.
- vocational rehabilitation applicants frequently fail to inform their counselors that they are receiving, have applied for, or recently received welfare money.
- vocational rehabilitation is effective in reducing welfare expenditures: in the Wood County Project sample, 62% of the clients had been recipients sometime before rehabilitation while only 5% received any assistance at closure, an estimated savings to the public of $363,873.

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PREFACE

The Research and Demonstration Grant Program of the Social and Rehabilitation Service, U.S. Department of Health, Education, and Welfare (HEW), supports a research institute in each of the eight regions of the Department as a facility for scientific studies in rehabilitation. The basic purposes of these institutes have been defined as follows: (a) to develop a program of core research in an area important to vocational rehabilitation; (b) to provide consultation to state vocational rehabilitation agencies (DVR) on operational problems subject to research; and (c) to participate in the conduct of operational research at the request of state DVR agencies. Thus, the programs of the institutes were designed to provide a comprehensive and programmatic attack upon the major research problems in vocational rehabilitation, with each institute providing a unique contribution through its core research and through utilization of regional and local resources and professional talents.

In HEW Region V, the Regional Rehabilitation Research Institute (RRRI) was established at the University of Wisconsin in October, 1963, for a program of core research on the roles and functions of the DVR counselor in the client rehabilitation process. Since rehabilitation counseling is a new field at a challenging stage of professionalization, it is of major importance that counselor services be well-founded on research-based knowledge. Broadly stated, the objective of the RRRI is the advancement of the research foundations of rehabilitation with special attention to the central professional person, the counselor who is responsible for the delivery of services.

Within the University, the RRRI is affiliated with the Rehabilitation Counselor Education Program. This affiliation assures the professional resources and participation of the rehabilitation counselor education staff and students. Staff studies, doctoral dissertations, and master's theses have made a substantial contribution to the core research of the Institute. In turn, the Institute facilitates research-oriented training and continuing interest of graduate students in rehabilitation research.

The research model of the Institute was designed to serve in problem finding, selection, and classification, as well as in information retrieval and dissemination. It is based on the premise that the client rehabilitation process is influenced by counselor services in interaction with the context of these services and with the handicapping characteristics of the client. In the model, there are three dimensions: counselor services, context of services, and handicapping characteristics. Nine counselor services are conceptualized: (a) case finding, (b) eligibility determination, (c) counseling and vocational planning, (d) provision of restoration services, (e) provision of client training, (f) provision of supportive services, (g) employment placement, (h) consultation provided to other agencies serving the handicapped, and (i) public relations. Contextual covariables include selected attributes of: (a) the client, (b) the counselor, (c) the agency, and (d) the community. Handicapping conditions are classified as: (a) physical, (b) emotional, (c) mental, and (d) cultural.

Identification of potential projects for Institute core research is derived from three basic sources: (a) expressed needs of rehabilitation counselors (as determined by surveys, direct consultation, and regional planning), (b) the DVR agencies' requests which are consistent with the objectives of the Institute core research and have operational application, and (c) systematic search of the relevant literature to identify important and researchable problems.

Two major types of investigations are sponsored—one, the development of measures of the functions and their covariables, and two, the assessment of their interrelationships. The core research of the Institute is supplemented by satellite projects relevant to rehabilitation counselor functions. The *Wisconsin Studies in Vocational Rehabilitation* represents the principal means of disseminating the Institute's research findings to rehabilitation practitioners and researchers.

GNW

FOREWORD

The present monograph departs from the research approach of previous UW-RRRI reports by emphasizing an analytic technique and subject interest of the economist. The change in focus and methodology for this particular study was dictated by its goals. Unlike our previous studies, we are here interested in a determination of the ratio of benefits to costs of the vocational rehabilitation process. The primary purpose was to compare the relative value of rehabilitation for the culturally disadvantaged to that of the medically disabled by benefit-cost analysis.

The results of this study confirm the effectiveness of the public rehabilitation process, i.e., traditional vocational rehabilitation services as delivered by the rehabilitation counselor. As suggested in the benefit-cost analyses of other researchers, the rehabilitation process is highly effective; in our study, for every dollar spent on the medically disabled, $25 will be returned in increased lifetime earnings. What is new information, and hopefully reassuring to all, is our finding that the benefit-cost ratio for our sample of culturally disadvantaged was an impressive 70 to 1.

These results should be a source of tangible reassurance to rehabilitationists who are being confronted with the responsibility of dependent people as a new client group. The situation is not unlike that which occurred in the middle 1940s when Congress expanded vocational rehabilitation eligibility criteria to include not only the physically disabled but also those vocationally handicapped because of mental disablement. There was a natural reluctance by rehabilitation workers to accept clients they considered to be fundamentally "different" from the physically disabled they had been serving. But eventually counselors found that both groups had the same basic problem—a handicap to vocational adjustment—and that the vocational rehabilitation process was effective with both disability groups. Now in this study it is demonstrated for the rehabilitationist that the vocational rehabilitation process can also be effective with the culturally disadvantaged when the counselor focuses on their vocational adjustment.

Along with the rehabilitation agency, public welfare workers are also concerned with ways of making the culturally-handicapped person financially independent and vocationally adequate. The present study presents dramatic evidence of the viability of a working plan in which social and rehabilitation service agencies worked together to deal with the problem of cultural disadvantagement.

Because of the special economic emphasis of this study, a number of experts served as consultants for various phases of the Project. The RRRI expresses its appreciation to these individuals for their assistance but takes complete responsibility for any weaknesses in the present report.

GNW

INTRODUCTION

The American state-federal vocational rehabilitation program has had an impressive history, covering half a century, in rehabilitating the medically disabled. Legal restraints and inadequate financial support, however, have limited the number of persons receiving services to a small percentage of the vocationally handicapped and dependent population. The Wood County Project was designed to demonstrate the potential benefits of extending services to all handicapped persons and to define administrative guidelines for the transitional and operational phases of the expanded program. The underlying thesis of the Project was that established (traditional) techniques developed over the years by state rehabilitation agencies—individualized client services using agency and community resources—can be effectively applied for the vocational adjustment of a much broader range of unemployed and underemployed people. The caseload of an experimental agency was expanded *vertically* to include a larger number of the handicapped with medically-defined disabilities and *horizontally* to extend services to persons with cultural (nonmedical) handicaps.

The Project, covering the five-year period ending June 30, 1969, was sponsored by the U.S. Department of Health, Education, and Welfare through a Research and Demonstration grant (RD-1629) to Adrian E. Towne, Director, Division of Vocational Rehabilitation (DVR), Wisconsin Department of Health and Social Services. The University of Wisconsin Regional Rehabilitation Research Institute (UW-RRRI) conducted the research, as reported in this monograph series. All client services were provided by DVR. Grant funds for the Project—including research, client service demonstration, and the establishment of two new workshops—totaled 1.5 million dollars for the five-year period.

Definition of Terms

Client group referred to one of the following: (a) *medically handicapped:* having a vocational limitation associated with a

physical and/or mental (retardation or disturbance) disability; or (b) *culturally handicapped* or *disadvantaged* (the two terms are used synonymously): having a vocational limitation associated with a social, financial, and/or educational disadvantage. Culturally-disadvantaged clients who also had a mental or physical disability were classified as medically handicapped.

Experimental area referred to Wood County where the expanded program was established and operated by the Wisconsin DVR as the demonstration site or experimental agency for the Project. Several *control areas* in which Wisconsin DVR offices, or traditional agencies, were located were designed for comparison purposes: (a) *primary control area:* Eau Claire County; and (b) *other control areas:* Wood County (pre-Project status), selected counties, the state of Wisconsin, and the nation as a whole.

Project Settings

Wood (1960 population, 59,105) and Eau Claire (1960 population, 58,300) counties, the experimental and the primary control counties respectively, and the other control counties involved were generally rural-urban in character, having primarily Caucasian populations of similar size; 15% to 20% of the families in each county had annual incomes below $3,000. The economies of these areas were based both on industry and agriculture. In general, there were good educational, vocational, and medical resources available for rehabilitation.

Agency Administration and Staffing

The Wood County agency, established and operated as a special district office of the Wisconsin DVR, was provided with the necessary staff and budget to meet the responsibilities of an expanded case-service load. Agency services (e.g., counseling, training, job placement) were identical to those available throughout the state-federal rehabilitation program (except for an additional provision for relocation expenses of Wood County clients). Traditional procedures for delivery of services were followed, including geo-

graphic assignment of the counselors who worked as generalists; none of the Wood County counselors served as a specialist in terms of handicap group or function in the rehabilitation process. Throughout the Project's administration, the agency operated in accordance with statewide DVR regulations and personnel policies; case processing and coding were consistent with state and federal regulations. Some extra time demands were made on the staff for data collection.

The staff members of the Eau Claire County (control) agency were, in general, better educated and had had more professional experience than those in Wood County. In addition, the employment pattern in the Eau Claire agency—established for many years as a permanent DVR office—was more stable.

Research Procedures

The research plan was formulated to assess the impact of the expanded program on (a) the client, (b) the agency, and (c) the community. Details of the research design and operational plan were developed in an initial six-month planning period, with special attention given to the collection of pre-Project control data. In the first 24 months, instruments unique for the Project's purposes were developed. In addition, an on-site data collection office was established, and data processing procedures were refined. Concurrently, the experimental agency was expanded at a pre-planned rate: personnel were employed and oriented, workshop facilities were established, and public relations efforts accelerated to an appropriate level. Thus, the third and fourth years of the Project represent the period of an established, maximized agency operation, i.e., it operated with full staff and budget as the "model" expanded agency. During the fifth and final year, no new clients were added to the existing data bank, and agency operations were reduced.

Sources of data concerning the impact of services on the client included the UW-Wood County Project Client Test Battery, composed of published instruments measuring educational achievement, intelligence, and perceptions, and instruments developed by the UW-RRRI staff as indicators of client characteristics. Each applicant

was referred by his counselor for the Test Battery. After acceptance, a client's handicap in significant life areas was rated by his counselor, who also kept a record of the time and nature of his work with and for individual clients. Approximately six months after closure, the follow-up instruments of the Test Battery were administered by representatives of the UW-RRRI staff.

The impact on the agency was assessed by examination of the DVR and UW-RRRI records concerning changes in staff, type of caseload, services rendered and purchased, and costs resulting from the expansion of the program. During 1966 and 1967, counselors from both counties also completed a record of contacts made with or concerning clients during the rehabilitation process.

The impact of the expanded program on the community was assessed by data collected before the Project's initiation and at its termination concerning community members' knowledge of and attitudes toward rehabilitation and the handicapped. In particular, financial records were examined for a benefit-cost analysis and changes in public assistance expenditures.

Continuous and up-to-date research data records were provided by a model for the establishment of a data bank. Concurrently, a coding guide for all variables was completed to initiate the data-collection model. A Client Master File was constructed to include client demographic characteristics, test performance, and expenditures by type of service, e.g., counselor time, purchased resources.

Description of Client Populations

Records from fiscal years 1965-66, 1966-67, and 1967-68 indicated that 1,734 persons (521 culturally handicapped and 1,213 medically handicapped) were referred in Wood County and 850 in Eau Claire County. Of these, 1,553 were accepted—336 culturally- and 788 medically-handicapped persons in Wood County and 429 medically handicapped in Eau Claire. Closed as rehabilitants were 265 culturally- and 756 medically-handicapped clients in Wood County and 317 in Eau Claire County. As of June 30, 1968, the

number of clients remaining in each status was as follows: (a) referral: Wood—cultural, 59, medical, 194; Eau Claire—62; (b) accepted: Wood—cultural, 77, medical, 194; Eau Claire—224; and (c) in training: Wood—cultural, 27, medical, 24; Eau Claire—17.

To describe the client populations, a comparison was made of specific handicap subgroups, viz., the culturally, physically, and mentally handicapped, on relevant demographic variables.[1] These comparisons indicated that some characteristics were associated with all subgroups: (a) race: white; (b) number of dependents: less than three; (c) primary source of support: family and friends; (d) secondary disability: none; (e) employment outlook: having difficulty in finding a job or not looking; no post-rehabilitation job available; (f) intellectual ability: average intelligence (many culturally-handicapped clients scored at the 69th percentile on the Raven's PM, however) and client perception reported as "average" or "above average"; and (g) educational achievement: higher grade-level equivalent performance in reading than in arithmetic.

Characteristics differentiating the subgroups were the following: age, sex, primary source of support, source of referral, marital status, onset of handicap, driver's license and automobile ownership, employment status, highest grade completed, and educational achievement. For a definitive description of the Wood County Project, the reader is referred to the introductory monograph of the series (Wright, G.N., Reagles, K.W., & Butler, A.J. *An Expanded Program of Vocational Rehabilitation: Methodology and Description of Client Population.* Monograph XI. 1970).

[1] It should be noted that individuals with mental or physical disabilities were excluded from the culturally-disadvantaged classification and systematically classified as medically handicapped. This assignment underlies some of the subgroup differences reported in this section—particularly the differences between the culturally disadvantaged and the mentally handicapped, one-third of whom were mentally retarded. There is a particularly high prevalence of disability among the culturally disadvantaged, but theoretically these people (with disabilities) are entitled to public rehabilitation services under traditional eligibility criteria. The exclusion of the culturally disadvantaged with medically-defined disabilities from the culturally-handicapped population in the Wood County Project permitted analysis and interpretation of data concerning the horizontal expansion of the rehabilitation program.

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The Economic Impact of An Expanded Program of Vocational Rehabilitation

THE NATURE AND SCOPE OF THE PROBLEM

The Wisconsin rehabilitation experiment—the Wood County Project—was based on the concept of saturation coverage—to make vocational rehabilitation services available to virtually every handicapped (both medically and culturally) person in the county. The expansion required an increase in agency resources—staff, facilities, and case service funds.[1]

Of major importance in developing and evaluating such an expanded program was the following question: Are the post-rehabilitation benefits to the individual and to society sufficient to warrant the expenditures involved in expanding the public vocational rehabilitation program? The purpose of the present study was to perform an economic evaluation of the Wood County program's effectiveness in extending vocational rehabilitation services across the entire spectrum of handicapping conditions. The actual cost and increased earnings for each case and also the total reduction in county public assistance expenditures were calculated. Special attention was paid to the progress of the culturally-disadvantaged clients who were, for the first time, receiving traditional vocational rehabilitation services.

This study (except for the public assistance aspect) used benefit-cost analysis, one of the analytical tools of economists. This technique attempts to sum benefits and costs of a project that can be expressed in monetary terms. The ratio of benefits to costs per rehabilitant provides one measure of project success. The results of this analysis provide a basis for future program planning and budgeting.

This benefit-cost analysis is limited in that a complete evaluation of all factors was not attempted; it concentrated only on the increase in earnings for each client as a result of rehabilitation services. Many benefits result from vocational rehabilitation over and beyond increases in earnings. Other quantifiable benefits could have

[1] A detailed description of the Wood County Project is presented in the Introduction to this monograph.

been claimed, e.g., the impact on the economy of the community resulting from the agency's larger budget for purchase of case services.

Many intangible benefits are apparent but not included in the present study. No attempt was made to develop methodology for placing a monetary value on psychological and social adjustment. These qualitative benefits, however, were demonstrated and reported in other monographs of *Wisconsin Studies in Vocational Rehabilitation.*

To the extent that these limitations tend to reduce the ratio of benefit to cost, the reported results can be considered to represent a conservative estimate for the population studied. Caution in generalizing to other populations is, of course, indicated (see Wright et al., XI, 1970).

Definition of Terms

Certain economic terms basic to this study are defined below:

Benefits are composed of the projected increase in personal lifetime earnings of the clients closed as employed following receipt of state vocational rehabilitation services. (The benefits derived from the reduction in public assistance to rehabilitants and other benefits were *not* included.)

Costs consist of DVR expenses, i.e., counselor salaries, administration, purchase of client services (chargeable to the individuals whose cases were closed as rehabilitated and also all other DVR expenses including non-rehabilitated closures, the cost of which was prorated and charged to "successful" closures).

A *discount rate* was used to allow for risk and uncertainty in the estimation of future earning of the rehabilitated. This rate must discount, at a minimum, for (a) the *opportunity cost* of the Project funds involved—the opportunity forfeited to use these funds for alternative programs as measured by the minimum rate at which the government can borrow money (a minimal-risk interest rate); (b) the *social rate of time-preference*—current benefits are preferred to future, while future expenditures appear less burdensome than

present; (c) uncertainty in the potential for Project returns (potential positive results).

Research Questions

The following research questions were posed for this study:

(a) What is the extent and value of the benefits derived from expansion of the rehabilitation program to include all vocationally-handicapped persons?

(b) What are the economic costs of an expanded program?

(c) What are the relative economic returns—benefit-cost ratio—from vertical expansion of rehabilitation as compared with horizontal expansion?

LITERATURE REVIEW

Decisions involving the expenditure of public funds must take into consideration the relationship between the benefits of a program and its costs. The application of the economists' technique of benefit-cost analysis has been most often documented for U.S. government expenditures in the fields of water resources and transportation development, but an increasing number of studies have attempted to assess its value for other fields. Benefit-cost analysis is defined (Hamburg & Langford, 1964) as the formal study of the consequences of alternative courses of action or programs by weighing their positive gains (benefits) and negative results (costs).

The purpose of this literature review is to give the reader a background of the technique of benefit-cost analysis so that he can fully appreciate how that technique has been applied to the Wood County Project. The literature reviewed is discussed in terms of general economic theory, applications of benefit-cost analysis in manpower programs, in general, and vocational rehabilitation programs, specifically, and the flexibility and limitation of conventional benefit-cost technique.

Economic Theory

Benefit-cost analysis is a practical way to assess the desirability of projects in which it is important for the researcher to take a long view (Prest & Turvey, 1964). In this way, intelligent choices may be made between alternative methods of dealing with problems. Typically, the analysis takes the form of an attempt to compare the benefits and costs for different procedures or populations in order to assess the desirability or merit of each (Krutilla, 1961).

In enumerating benefits and costs, the researcher must clearly define the program and take into account relevant costs and benefits. Because the greatest costs occur during a project, while most of the benefits must be anticipated as occurring in the future, it is necessary to *discount* future benefits back to the year in which the expenditure was made. This is analogous to investment decisions in the business

world where promises to pay money at some future date are "discounted" to present day values (usually through the use of the market interest rate). In the valuation of costs and benefits, the relevant prices, non-marginal changes, market imperfections, taxes and controls, unemployment, and intangibles must be taken into account. *Intangibles* is a term used to describe costs and benefits which cannot be easily quantified.

When dealing with the costs and benefits of manpower programs, it is necessary to consider an additional factor—the probability that the individual participating in these programs will become disabled or die at some future date. This consideration is of special concern when dealing with individuals who are already disabled (those eligible for vocational rehabilitation programs); thus, it is necessary to use actuarial tables to determine these probabilities.

Various methods can be used to choose a discount rate. The government borrowing rate is a popular and easily applicable figure because it can be regarded as a "risk-free rate of interest." In the Wood County Project, a four percent (4%) discount rate was used. Methodology generally followed a benefit-cost analysis of vocational rehabilitation by the U.S. Department of Health, Education, and Welfare (HEW):

> A discount rate reflects the extra value of current earnings over an equal amount of earnings the following year. An aggregate of future earnings overstates the present value of those dollars unless discounting is applied. Discounting, therefore, tries to put a brake on exaggerating the value of future earnings. The amount of discounting is not readily agreed upon by economic analysts. A rate of 4% was applied in this analysis because of its common use and because it was the rate employed in similar studies within the U.S. Department of Health, Education, and Welfare (p. 17).

Since interest rates frequently change, discount rates used in benefit-cost comparisons also change. Use of higher rates tends to reduce present values of future benefits and thus affects the benefit-cost ratio.

Applications of Benefit-Cost Analysis

Application in Manpower Programs

Dorfman (1965) has edited, with a commentary, papers on seven types of government projects using benefit-cost analysis. Since a large proportion of government expenditure has been devoted to the construction of roads, hydroelectric projects, and other physical facilities, most of benefit-cost analyses conducted have been for these types of projects. Importantly, these projects have not presented the difficulty in evaluation as have the social service projects. However, Dorfman stated that there have been evaluations of social action programs, such as urban renewal, with use of the benefit-cost technique.

Jenness (1969) discussed the use of benefit-cost analysis for manpower mobility programs. He strongly differentiated between occupational training programs, which are intended to strengthen human capital, and geographic mobility programs, which merely transfer given skills to places where they generate a higher marginal product. He also discussed the Canadian scheme, which he found much more extensive than U.S. mobility programs, and included a manpower mobility benefit-cost model.

Bateman(1967) described an application of benefit-cost analysis to the Work-Experience and Training Program, one of many federally-supported programs to reduce poverty and dependency by helping individuals develop their capabilities to support themselves. The program focused on potentially employable poor persons with little formal education who were unemployed and who lacked the means to support themselves and a comparatively large number of dependents.

For the study, the benefits of the Work-Experience Program were divided into two parts: (a) the immediate benefits of a work-relief program (in part, the output produced by people presently employed who would otherwise be unemployed); (b) the long-term benefits of reduced dependency and improved potential for economic independence and self-support. The costs calculated

were based on those costs incurred by the state and federal governments for the individual's participation in the program. Costs included administrative expenditures, work-related expenses (transportation, clothing, etc.), and public assistance payments made to participants while in training. The cost estimates varied according to the individual's state of residence. In addition, the cost estimates depended on the amount of public assistance payment an individual would have received from the government in absence of the program.

The results of the benefit-cost analysis for the program revealed that the projected earnings of the participants were not greatly increased by the program. The data collected from a three-month follow-up survey indicated that the average monthly salary of those individuals who had enrolled in and terminated the program and who were employed at time of follow-up was $250. When this figure was compared to the earnings of a group of non-participants (public assistance recipients who had received another type of training under the Manpower Development and Training Act and who had the same socio-economic and demographic characteristics as the participants), the average monthly salary was about the same. The most significant difference found between the participants and non-participants was the much larger proportion of the *latter* who were employed after training: 64% compared to 42%.

Nevertheless, the Work-Experience Program was not a failure. The researchers calculated that to break-even, the present value of the participants' future earnings had to be increased by only two percent (at younger ages) or three percent (at upper ages). And if incremental public assistance costs were not included in the costs of the program, the increase in wages needed would be much less (.5%). Unfortunately, programs that just "break-even" are not usually given high priority status.

A benefit-cost analysis was performed on vocational retraining of Indians at the Madera Employment Training Center in California (Mangum, 1969). Benefits used for the analysis were those gained by the individual trainee; costs were estimated for both the trainee and the government. Assuming a work span of 40 years at a constant wage rate, a benefit-cost ratio of approximately three to one was calculated.

Benefit-cost analyses of occupational training programs were reviewed by Hardin (1969). The programs focused on occupationally-oriented institutional training of adults who were usually unemployed or underemployed. Hardin's review covered many programs in many states and aimed at an evaluation of the benefit-cost technique used in these programs. Hardin emphasized the importance of distinguishing exactly who benefits from such training programs: society, the individual trainee, or the government.

In a study in West Virginia, Cain and Stromsdorfer (1968) calculated the effect of training on earnings. The authors compared a group of graduates of training programs to a group of non-applicants. The authors concluded, from their economic analysis, that government-sponsored training programs for the unemployed are economically beneficial; the benefits to the trainees and to society outweighed the costs of the program. And if social and psychological factors of an individual being able to support himself and his family are considered, then the program appears even more positive.

In a benefit-cost analysis of training programs in Michigan, Hardin and Borus (1969) compared the types of courses the programs offered. Assuming a 10-year service life and using a 10% discount rate, the authors calculated a 1.2 to 1 ratio for the courses they actually studied and a 1.5 to 1 ratio for a sample group (which was comparable to the estimated composition of Michigan training according to course duration). These ratios were those for the *society* as a whole; for the *individual,* the authors calculated a ratio of 5.9 to1.

Hardin and Borus found very sharp differences in ratios between short courses and medium and long courses. Training in short courses (60-200 hours per person) had a benefit-cost ratio of 17.3 to 1 for *society*, 21.2 to 1 for men and 22.1 to 1 for women. Training in medium and long courses (201-1902 hours per person) had a zero or negative ratio for both society and the individual because the training costs were higher for longer periods of time but the increase in earnings was not any greater. Only 30% of the trainees studied were in the shorter courses.

When looking at the benefit-cost analysis in terms of gains for the government, Hardin and Borus calculated that the government

was not able to recoup its investment of funds in the Michigan program unless the discount rate was substantially less than eight percent. In fact, given a service life of 10 years, the internal rate of return was negative. Reweighing the sample to take into account the probable course length did not change the result very much. Since tax collections and welfare payments vary with an individual's earnings, the inverse relationship of benefits to course duration also affected government benefits. In a short course, the government made some gains: the benefit-cost ratio for the government was 4.2 to 1 for the trainee (using a 10% discount rate). However, in a medium or long course, the average benefit per trainee was small or even negative, while the initial outlay was positive and large.

The benefit-cost analysis in this program was extremely useful. It resulted in the information that enrollment in a training class is financially attractive to the average trainee but that short courses are more attractive than long ones and do not require a capital investment which a prospective trainee might not be able to make. The analysis also indicated that transferring retraining efforts from medium or long to short courses would help make the government's expenditure more efficient.

In conclusion, the analysis suggested that social-economic benefits and costs may be more accurately measured if the social effects are clearly defined and if the decision is made to focus on effects of goods and services or to include transfer payments in the evaluation. Progress should also be made in identifying and measuring the external effects of training; output effects should be estimated from employee compensation instead of earnings. Similarly, a choice needs to be made between defining individual benefits and costs in terms of disposable income or other criteria (e.g., a value for increased or reduced leisure time) and a clarification of what is to be meant by "economic effects on the government." More importance should be given to estimating variations in benefit-cost relationships associated with forms and degrees of training and other conditioning variables. Evaluation studies could be more effectively conducted in geographic areas where adequate government data are available to the analyst, so that the cost of the evaluation may be reduced and the results made available while they still apply to current problems.

Application in Vocational Rehabilitation Programs

A review of projects for disabled public assistance clients was conducted by Grigg, Holtmann, and Martin (1969). At the outset of their evaluation of 14 Research and Demonstration projects, the authors claimed that "the vocational rehabilitation process is so multidimensional in nature that an economic analysis of it is insufficient by itself" (p. 168). Their benefit-cost analyses indicated ratios ranging from 35 to 1 to 16 to 1 for white males, 36 to 1 to 12 to 1 for white females, and similar but slightly lower ratios for blacks. Their calculations also indicated that as the client's age increased and the amount of his education decreased, ratios became lower. The authors concluded that "vocational rehabilitation for welfare recipients seems to represent a sound social investment even under the most conservative assumptions about the nature of the benefits" (p. 168).

Legge (1969) reported on the rehabilitation activities of the Ontario (Canada) Workmen's Compensation Board which was concerned with whether its rehabilitation program could be justified from a broad economic point of view. To quantitatively assess the benefits of its vocational rehabilitation program, the Board conducted a comparative study of the pre- and post-accident earnings of workmen injured in two time periods: 1927-28 and 1965-66. The two periods were reasonably similar in prevailing economic conditions but neither medical nor vocational rehabilitation services were offered in 1927-28. For the sample, 200 industrial accident victims were chosen from each period. The researchers verified that those in the earlier period would have been eligible for and would have received services had they been available, and that those in the later period had received services. The researchers then calculated the increase in the disabled man's earning power attributable to the intervention of rehabilitation services; both direct costs (salaries, equipment, travel, and overhead) and indirect costs (wages lost by the workman while receiving services) were considered. Legge reported that the findings were encouraging: on the average, the injured workman who received services (as compared to those who

did not receive services) experienced a net additional income gain of $15,200 over his remaining working life; costs averaged only $1,200.

Kaim-Caudle (1969) discussed a survey and evaluation of the post-rehabilitation placement of 236 former clients of the Rehabilitation Institute of Ireland. The average vocational rehabilitation cost (allowing for overhead expenses and assuming an average length of training of about one year) was about $720 per client. If rehabilitation would make an individual independent of public support for just two years, the cost of services would pay for itself. Moreover, assuming that rehabilitation makes the average successful trainee independent for eight years, vocational rehabilitation would be self-financing (even with a success ratio of only 25%). Kaim-Caudle's findings represent additional evidence of the economic justification for the provision of vocational rehabilitation services—justification which is recognized internationally.

The three studies reviewed above concerning benefit-cost analysis in vocational rehabilitation programs indicated that the technique is a useful tool for quantifying results of changing human resources. The following three studies that are reviewed apply more specifically to the methodology and philosophy of the present investigation. Therefore, they are discussed in more detail.

The U.S. Department of Health, Education, and Welfare, Division of Statistics and Studies, developed a procedure for benefit-cost analysis of vocational rehabilitation *(An Exploratory Cost-Benefits Analysis of Vocational Rehabilitation,* 1967). The Wood County methodology was based upon this report and is discussed in depth in the next chapter.

The report revealed from benefit-cost analysis of closed cases during fiscal 1966 that vocational rehabilitation services were indeed worthwhile in helping individuals become financially independent. For example, the estimated lifetime earnings of rehabilitated wage earners (n = 127,824) would be increased by $4,482 million (as a result of services); the total cost for *all* persons receiving services was $147 million; therefore, the benefit-cost ratio for rehabilitated wage earners was conservatively estimated as 30 to 1—$30 in increased lifetime earnings for every dollar expended for services. Similarly,

due to services the lifetime value of work activity of homemakers and unpaid family workers (n = 24,127) would be increased by $668 million; when this was compared to the $147 million spent for *all* rehabilitated homemakers and unpaid family workers, the benefit-cost ratio was approximately five to one. Using the same method of calculation, the ratio for self-employed farmers (n = 2,328) was .6 to 1 and for non-rehabilitated closed cases .05 to 1. Thus, not only does the technique of benefit-cost analysis in vocational rehabilitation programs help quantify the benefits derived from services, but it also differentiates between specific groups of clients. Such results help facilitate future planning and program development.

Two recent studies of the economic impact of vocational rehabilitation programs are of philosophical and analytical importance to the present investigation, even though both were published after the present investigation was conducted.

The first of these studies is by Conley and was published in 1969. This study in addition to his previous work in the field (1965) has helped vocational rehabilitation programs evaluate their economic impact not only upon the clients served but also upon the nation as a whole. Conley, in contrast to most benefit-cost analysts, and to the present investigation, looked at the net benefit in increased tax revenues (of interest to taxpayers who ultimately pay for rehabilitation services).

In the 1969 study, Conley computed benefit-cost ratios from national vocational rehabilitation program data for the 1967 fiscal year. He found, by conservative estimates, that the 170,000 disabled persons who were rehabilitated during this year increased their lifetime earnings by $4.7 billion or about $8 for each dollar of the *social cost* of rehabilitation service.

This eight to one ratio may appear low; however, Conley used the concept of *social costs* rather than *program costs* as most analysts did. According to Conley, simply using the direct, measurable costs does not truly present the total cost of providing vocational rehabilitation programs for the disabled; the real cost to society is much greater.

Conley estimated that social costs are at least 50% higher than program costs. Adjustments in program costs had to be made in six areas to estimate the actual or social costs. First, usually added to program costs are those costs of providing maintenance support to clients. Conley said that these maintenance expenditures are merely transfer payments and not true social costs. Therefore, the cost of providing maintenance *reduces* program costs by seven percent. Second, when a program is growing and increasing the number of people it serves, the number of carry-overs is slightly greater at the end of a year than at the beginning. This trend *reduces* program costs another two percent. Third, program costs must include the cost of services provided by parties other than rehabilitation agencies; this consideration *increases* program costs by four percent. Fourth, statistics show that about one-fifth of those persons rehabilitated return to the rehabilitation agency for further services at some time in the future. This trend *increases* actual program costs by, according to Conley, 22%. Fifth, an adjustment must also be made for the possible earnings the client fails to receive while undergoing rehabilitation. According to Conley's calculations, foregone earnings during the rehabilitation process would be equal to about 35% of estimated annual earnings at time of closure. And sixth, program costs should include some portion of the expenditures made for previous research, training, and construction; because such expenditures are usually publicly or privately subsidized, they are not necessarily included in the costs of rehabilitation services. However, Conley believed that 25% should be *added* to program costs for these purposes. According to Conley, then, to estimate the social cost of rehabilitation, program costs must be *increased* by 42% *plus* 35% of estimated annual earnings of rehabilitants at closure.

Everyone concerned with evaluating the total, real costs of rehabilitation programs would quickly recognize the existence of social costs as conceptualized by Conley, even though his specific figures could be disputed. In conducting a benefit-cost analysis, the researcher must be careful to communicate clearly which costs (program costs, social costs, or program costs including some but not all social costs) are used to calculate the benefit-cost ratio.

Conley and others have also challenged the use of increase in earnings to measure the effectiveness of rehabilitation services. Conley noted three problems in the use of reported earnings at the time of acceptance and at closure.

First, only the effect on the earnings of the rehabilitant is considered, even though related effects may be influential. For example, there is the effect of the spouse (in this case, usually the wife) leaving the labor market once the husband is able to support the family unit. There is the effect on the children of possible increased productivity as a result of the assumed better care and training the children would be able to receive once the family wage-earner has begun to satisfactorily support the family.

Second, the use of increase in earnings to calculate a benefit-cost ratio assumes that the rehabilitant would have continued to earn the same amount as reported at acceptance had he not received services. Because very little research has been conducted on this issue, such an assumption cannot be accepted or rejected. There is the possibility that potential clients will intentionally underestimate their earnings to increase the chances of meeting a financial need test, or that they may simply report inaccurate earnings. According to Conley, figures reported by the client at acceptance may tend to "overstate the potential productivity of clients who seek special services to prevent job loss" (p. 229). Conley pointed out that there is no accurate way to determine the length of time prior to acceptance that is most indicative of the potential earnings of rehabilitants who do not receive special services. The biggest danger appears to be the use of too short a period; in this instance, the earning ability of many is grossly underestimated.

Third, there are also difficulties when dealing with earnings at closure. Because earnings will most likely vary over time, a true picture is not indicated by the use of earnings at closure to determine the increase in lifetime earnings. Some of the rehabilitants may lose their jobs; some will experience a reduction in earnings due to increasing debility; some will suffer from lack of motivation; some will be affected by the economic conditions of the job market; some will retire at an early age (before 65); some will die. (Of those who

are employed until retirement age, research has indicated that the amount of earnings usually decreases at age 60 and over.) Conversely, some of the rehabilitants will experience an increase in earnings due to greater proficiency and seniority; some may find themselves in great demand because of certain skills that were not needed before. All of the above are logical possibilities and because of the lack of research in the area, no one can objectively predict what may happen. Nevertheless, Conley felt that in the absence of adequate follow-up techniques and studies, benefit-cost analysis could realistically use earnings at closure to determine the projected increased lifetime earnings of the rehabilitants.

The second study, conducted by the Michigan Department of Education, Division of Vocational Rehabilitation (1970), used the total net increase in lifetime earnings for the benefit-cost calculations. The present investigation used the same technique. The researchers in the Michigan study felt that use of increase in lifetime earnings was justified on two grounds: first, the agency views the maximum increase in earnings possible as its goal in providing vocational rehabilitation services; second, the agency is not primarily interested in the increased amount of tax revenues but in the increased lifetime earnings—in a tangible and objective demonstration that the rehabilitated client has made a better *vocational adjustment*.

The population for the Michigan investigation was comprised of all individuals rehabilitated (6184) by the Michigan DVR during the 1968 fiscal year. A random sample of approximately 600 former clients was selected from the total population. A follow-up questionnaire was devised and administered by trained graduate students in the Michigan State University Rehabilitation Counselor Education program by either telephone interview (80%) or by mail (20%).

The model of the Michigan study (see *Methodology* section of this report) used three benefits assumed to be totally attributable to vocational rehabilitation. These were: (a) "net increase in lifetime earnings of the rehabilitants," (b) "net decrease in the economic dependency of the rehabilitants," and (c) "net change in labor force participation of household members providing domiciliary care to the rehabilitant" (p. 22). The first two benefits have been frequently

used as components in models of benefit-cost analysis. The third, however, is of more recent conceptualization and is less frequently used owing to the difficulty in measuring this component with needed accuracy.

The state-federal legislation allowing clients to be rehabilitated as "homemakers" and "unpaid family workers" reflects an important understanding of the concept of vocational rehabilitation—the rehabilitation of one individual affects the lives of those around him, and vocational rehabilitation, while focusing on vocational adequacy, does not necessarily mean earning wages. For example, when a disabled homemaker is rehabilitated, another household member is then potentially freed from domiciliary care and is able to enter the labor market. The authors noted that although this third benefit is highly impractical to use in a benefit-cost analysis of national scope, it can be useful in smaller studies. The partial alternative to this variable is to categorize rehabilitants as "wage earners" and "non-wage earners" and to assign a wage value to the latter group (this was the method used in the present investigation).

Two cost components were included in the Michigan DVR model: (a) "total program cost of rehabilitation (case service plus administration cost)," and (b) "total assistance payments to clients during rehabilitation plus income foregone while in training" (p. 22). The Michigan study did not use the concept of social costs as defined by Conley (1969), although the authors recognized the importance of such costs. However, they did define the program costs used. Case service costs are relatively easy to compute: the total case service costs are divided by the number of clients receiving services to obtain an average case cost per client. On the other hand, administrative costs are not as easy to compute. The costs depend upon which state program is being examined. For example, in 1968 the Michigan DVR used only 45.3% of its total expenditures for case services, while in the same year the Wisconsin DVR expended 81.1% for case services (Rehabilitation Service Administration, pp. 8-9). Benefit-cost ratios must therefore be interpreted with such differences considered.

The second cost used in the Michigan DVR study was comprised of two parts: (a) the cost of assistance payments made to

clients while they were participating in training courses needed for complete rehabilitation, and (b) the amount of income the client lost while in training. It is assumed that he would have earned this income had he been employed and had not been receiving training. These costs were computed in averages for the Michigan study. In other words, the researchers used the average amount of assistance paid to each client while receiving training and the average amount of income lost by each client while in training.

For the entire sample, a ratio of 32.8 to 1 was achieved; i.e., for every one dollar of cost, a return of $32.80 was obtained. The Michigan DVR study also computed high and low benefit-cost ratios so that a range was produced, from 52 to 1 to 15 to 1. This method was suggested by Conley (1969) and is similar to a standard error of measurement. It was within this range that the "true" benefit-cost ratio existed. There is obviously a great deal of variability in this range.

The Michigan study included 58 rehabilitated disabled black clients as subjects. The present researchers were especially interested in these clients for purposes of comparison with results for the culturally-handicapped in the present investigation. However, the Michigan study did not indicate how many of these blacks could actually have been classified as culturally disadvantaged (although being black does, in the vast majority of cases, comprise a barrier to employment because of lack of social, economic, and/or educational opportunities for becoming vocationally adequate). In addition, the culturally handicapped clients in the present investigation were white, rural residents rather than black, urban dwellers.

Nonetheless, the results of the Michigan study were still interesting for comparison purposes. A benefit-cost ratio of approximately 40 to 1 was computed for the 58 disabled black clients; the authors concluded that vocational rehabilitation services were successful in coping with the employment problems of this group. Earlier studies on the culturally-handicapped subjects of the present investigation (Reagles, Wright, & Butler, 1970a and 1970b) resulted in the same conclusions as those made by the Michigan researchers.

Flexibility and Limitation of Conventional Benefit-Cost Technique

Benefit-cost analysis is not the only economic technique that can be used to evaluate programs. However, according to researchers, it appears to be the most feasible. For example, the Michigan study (1970) compared this technique to another frequently used—the net present value method. In the net present value method, the costs are subtracted from the benefits to obtain the net present value. If the benefits of one project are $3000 and the costs $1000, the net present value would be $2000. Similarly, if the benefits of a second project are $8000 and the costs $5000, the net present value would be $3000. By this method, the second project, because it has a larger net present value, should be given budgetary priority. However, if a benefit-cost ratio were calculated for the same two projects, the results would be much different. For the first project, the ratio of benefits to costs would be 3.0 to 1 ($3000 divided by $1000); for the second, the ratio would be 1.6 to 1. In terms of a benefit-cost analysis, then, the first project should be given the higher budgetary priority because it returns more money per each dollar expended.

The net present value method deals in absolute figures whereas the benefit-cost technique helps the researcher to determine which program has the greatest return per dollar invested. The Michigan researchers pointed out that the net present value method tends to be biased toward larger projects with high costs, whereas the benefit-cost method tends to be biased toward projects that have the greatest percentage of their costs in future time periods (using a discount rate) or that have lower costs (without a discount rate). The authors concluded that "in the case of vocational rehabilitation it can be argued that this [the bias of the benefit-cost method] is hardly undesirable, as the lower the cost per program, the better" (p. 10).

One of the major difficulties in the use of the benefit-cost technique is the determination of what is considered a cost and what is considered a benefit. This was brought to light in Conley's (1969) study discussed previously. Conley (1965, 1969) made a distinction between the use of social costs as opposed to program costs and the

use of increased revenues for benefits as opposed to increased lifetime earnings. Because there are so many variations, the first job of the researcher is to determine which variation is most suitable for the type and amount of data available and for the general research design of the study. Once this decision is made, the researcher must be very explicit in itemizing the costs and benefits that were used. Failure to be explicit may result in misinterpretation of the analysis by decision-makers (such as legislators).

Another consideration in the use of benefit-cost techniques is income redistribution. Freeman (1967) examined the implications of introducing income redistribution as a policy goal in public investment planning and project selection. He felt that income redistribution does matter greatly in these decisions. He also stated that "evaluation of these programs with conventional benefit-cost techniques seems to me to miss the point, since there is implicit in the public discussion of these programs the notion of a social welfare function embodying income distribution in some way" (p. 507).

The problem of income redistribution was reviewed by Weisbrod. He discussed "economic efficiency" as related to income redistribution and attempted to make a model that would help economists make decisions. He felt that economists have to try to consider distributional effects, and that consideration of efficiency alone is not enough. Maass (1966) clearly distinguished between projects that are *efficient* and those which bring out a *desirable redistribution of income.*

Weisbrod (1969) also discussed the application of benefit-cost techniques to social action programs. He felt that the benefits of manpower programs should be judged in terms of the program objectives (i.e., greater allocative efficiency, enhanced economic stability, and improved distributional equity). He felt that any evaluation of a manpower program should begin with the presumption that the program is not economically efficient in the sense that benefits in the form of increased worker productivity (as measured by earnings) exceed the real costs of the program. He also felt that even when manpower programs are not economically efficient, they have other virtues, particularly insofar as they have favorable income

distributional consequences.

When conducting a benefit-cost analysis of social action programs, the economist should take into consideration two economic theories (Cain & Stromsdorfer, 1968). First, he should utilize public investment theory which makes inputs and outcomes of social action programs (which are spaced over time) commensurable. Second, he should utilize welfare economics which analyzes the distinctions between financial costs and real resource costs, between direct effects of a program and external effects, and between efficiency criteria and equity (or distributional) criteria.

Prest and Turvey (1964) stated that the chief virtue of benefit-cost analysis is the technique's potential for taking into account all relevant benefits and costs. However, they emphatically pointed out that there are two very clear general limitations of principles (as distinct from the many more of practice) which must be recognized. First, benefit-cost analysis is only a technique for making decisions within a framework to be decided upon in advance and involving a wide range of considerations, many of them of a political or social character. Second, benefit-cost techniques as developed today are least relevant and serviceable for what one might call large-scale investment decisions. Especially in the enumeration of benefits, it is much easier to apply benefit-cost analysis to a limited purpose development than to long-range social action programs. According to the authors, there are four problems in the evaluation of benefits: trying to measure surpluses; allowing for imperfections, externalities, etc.; choosing an appropriate discount rate; and allowing in any systematic fashion for uncertainty.

Nevertheless, Prest and Turvey felt that most of the difficulties could be resolved. They stated that important advantages of a benefit-cost analysis are "that it forces those responsible to quantify costs and benefits as far as possible rather than rest content with vague qualitative judgments or personal hunches" (p. 734). When a researcher conducts a benefit-cost analysis, he forces himself to face questions and problems of value that he might not have faced otherwise. The authors felt that when all the weaknesses of the technique for the area of social services are openly recognized and

taken into consideration, then the results of the analysis become more useful.

Cain and Hollister (1969) distinguished between two types of evaluation: process evaluation ("administrative monitoring") and outcome evaluation (benefit-cost analysis). They said that it is important to note basic differences between benefit-cost analyses carried out allegedly with some speed and success in other areas and those which have been looked for but have generally not been forthcoming in the social action area. According to the authors, there has been relatively "poor performance" of evaluators in the social action area; researchers have to recognize that the methodology for evaluating social action programs would have to be developed in new ways to cope with their special difficulties. For instance, they considered problems of measuring such intangibles as self-images, community images, and opinion polls of peoples' attitudes toward and evaluation of programs. Cain and Hollister pointed out that "when we talk of evaluation studies leading to verdicts of success or failure, it should be recognized that we are greatly simplifying and abbreviating the typical results. Most social action programs are so complex in the variety of inputs and the multiplicity of objectives, that simple over-all judgments are not likely to lead to quick decisions" (p. 43).

Lampman (1966) discussed the approaches to the elimination of poverty. He felt that benefit-cost analysis has been a very good tool to evaluate the effectiveness of various programs and examined ways in which benefits and costs can be enumerated.

Dymond (1969) stated that benefit-cost studies measure what *can* be measured, but this is all they do. He felt that benefit-cost models are much more useful for altering or improving the effectiveness of a single type of program than they are for making comparisons between programs. In the manpower field, the benefit-cost technique can be used as an aid in managerial decision making. However, it is limited as a guideline for the substantial revision of human resource development programs.

Kimmey (1968) stated that the vocational rehabilitation field lends itself very well to the technique of benefit-cost analysis.

Without using the technique, it has been estimated that the tax return on the federal rehabilitation dollar shows a fourfold return for each one dollar invested. Using a benefit-cost analysis, the rehabilitated individuals served by various programs have returned to the economy 35 times the cost of their rehabilitation.

Summary

The authors in general felt that even though the technique of benefit-cost analysis is limited when applied to social action programs, it is still valuable when used properly. They emphasized that income redistribution is an important variable in social action programs and must be viewed as a benefit. In conclusion, the authors felt that given the limitations of benefit-cost technique, it demands that researchers attempt to quantify costs and benefits rather than putting forth subjective interpretations that are open to a wide variety of disagreements.

The literature reviewed above indicates that the benefit-cost technique can be adequately applied to vocational rehabilitation programs. The researcher must recognize the complexity of the technique (discount rates, the problems of program effects, etc.) and must adapt the technique to his particular project. And because of the complexity of the technique, researchers would be best advised to use conservative estimates of benefits and costs. When all of the limitations are taken into consideration, most of the authors found that the technique is a useful tool, even for social action programs.

METHODOLOGY

Benefit-Cost Ratios

Benefit-cost analysis can be a useful technique in the evaluation of the extension or expansion of vocational rehabilitation services and resources because it can encompass all relevant benefits and costs connected with changes of investment or selective administrative decisions. In such an analysis, the attempt is made to total (sum) all benefits and costs of a project that can be described in monetary terms. The ratio of benefits to costs per output unit (in this instance, the rehabilitant) provides a measure of project success. Following computation of such a ratio, the particular project may be evaluated in relation to other similar or possible public investment projects in order to allocate properly an increased volume of public funds. Once benefits and costs are calculated for a vocational rehabilitation program as a whole and for the separate portions (i.e., handicap categories) of a program, the anticipated economic return for the program can be determined and the relative economic desirability of the several parts of the program can be ranked.

For the purpose of calculating these costs and benefits, all Wood County clients closed as rehabilitated from July 1, 1966 through June 30, 1968 were included in the analysis and divided into four groups:

1. *Medical Rehabilitants Paid,* the 287 physically-handicapped, 80 mentally-ill, and 48 mentally-retarded clients who were employed as salaried workers at the time of closure;

2. *Medical Rehabilitants Unpaid,* the 103 physically handicapped, 16 mentally ill, and 13 mentally retarded who were closed as rehabilitated homemakers or unpaid family workers;

3. *Cultural Rehabilitants Paid,* the 187 clients with no physical or mental handicaps, but who had educational, socio-cultural, or financial barriers to employment and who were closed as rehabilitated wage earners;

4. *Cultural Rehabilitants Unpaid,* the 38 clients served under

the expanded criteria and who were closed as rehabilitated homemakers or unpaid family workers.

All clients closed as rehabilitated in Eau Claire County during the same period were similarly divided into two groups:

1. *Medical Rehabilitants Paid,* the 90 physically-handicapped, 63 mentally-ill and 25 mentally-retarded clients who were employed at closure;

2. *Medical Rehabilitants Unpaid,* the 20 physically-handicapped, 8 mentally-ill, and 10 mentally-retarded clients closed as unpaid family workers or homemakers.

For each group, the benefits of vocational rehabilitation services were calculated and the costs determined. The model utilized for these computations was derived from the concepts developed by the Department of Health, Education, and Welfare, Vocational Rehabilitation Administration, in *An Exploratory Cost-benefits Analysis of Vocational Rehabilitation,* 1967.

Calculation of Benefits

Successful rehabilitation means that a loss of national product has been avoided; the productivity of a worker has been improved through the receipt of services. Thus, the value of this *enhanced* productivity extended over the working life of a rehabilitant is a true economic benefit to be credited to vocational rehabilitation.

The benefits of rehabilitation are, of course, not limited to increased earning power. To the handicapped person, expanded possibilities for spending his leisure time or other personal benefits may outweigh the economic benefits of increased productivity. There are also other indirect benefits attributable to vocational rehabilitation services. For example, the Michigan DVR analysis (1970) listed the "lower cost of unemployment programs, greater job stability, greater individual satisfaction with life, lower crime rate and cost of crime prevention, lower cost of other government programs and greater economic productivity" (p. 75) as other benefits in addition to employment. It is an unfortunate limitation

of the methodology that benefit-cost analysis is unable to quantify these numerous social-phychological benefits of vocational rehabilitation and must therefore measure just that part of the individual's benefits that can be given explicit monetary value.

To estimate the economic benefits of vocational rehabilitation, it is necessary to ascertain what the average rehabilitant will earn over the remainder of his work-life. This figure depends on age at death or retirement, the proportion of persons at each age who will be productive, and their contribution to production at each age. From this benefit total must be subtracted the present value of the lifetime earnings that would have been made without rehabilitation. This calculation would not account for any increase in supplemental benefits, such as employer insurance contributions. Because such supplemental benefits differ greatly according to job category and individual employer (rather than wage rate), they could not be determined within the bounds of this study. The benefit calculations are therefore understated by the amount of these supplements.

In this study, benefits were measured in terms of the incremental lifetime earnings increase attributable to the receipt of rehabilitation services. This simple general model may be expressed as follows: (1) $B = N \sum_{t_i=1}^{T} \overline{W}$, where *B* equals total benefits resulting from rehabilitation services, *N* equals the number of workers receiving vocational rehabilitation, and *W* represents the means wage for those workers summed over the length of time that benefits will accrue.

The benefit calculation utilized average yearly earnings at acceptance and closure, multiplied by the individual's anticipated work-life (in years) to retirement age. The two earnings streams (years to retirement age) should be different to allow for foregone earnings during the training period. Average work-life *T* at acceptance was modified in terms of the length of time the client spent in the program. If a client received services for five months or

less, T at acceptance equalled *T* at closure.[1] The length of time of earnings for *each* individual subject was multiplied by the *mean* earnings of all rehabilitants, because the samples were too small for individual figures in both cases to be relevant. The calculations were computed in the above manner rather than the reverse—use of *mean* length of time multiplied by each individual's earnings—because the reverse would have necessitated division into so many categories (the large diversity between individual earnings) that inter-program comparisons would not have been meaningful.

The above theoretical model for benefit calculations does not take into account many of the modifications needed when actually determining benefits for clients of a vocational rehabilitation program. These modifications occur in many areas and will be discussed in detail in the following sections.

Paid Workers at Closure

Wage-earners at acceptance. If persons obtaining vocational rehabilitation services had never been employed prior to their acceptance into a program or did not have the possibility for employment, then the calculation of benefits would have been easy. The benefits would be the earnings that the person made following and as a result of the vocational rehabilitation program. This assumes, of course, that vocational rehabilitation services were completely responsible for any differences observed. However, a number of persons accepted for vocational rehabilitation services *were* employed at acceptance. Services were offered this group—the *under*employed—because their productivity could be greatly enhanced through such services. To determine the benefits as a result of services for this group, earnings that would have been obtained in the

[1]The anticipated earnings streams of each individual from acceptance (before services) and from closure (after services) were calculated from age (in years) at acceptance and at closure, respectively, to the anticipated retirement age. Age at closure was arbitrarily assigned a value consisting of age at acceptance plus whole years (rounded from months) in the program. Thus, 5 months or less in the program produced no change in age at closure, 6-17 months added one year to the age of the individual at closure, etc. Any errors were not expected to be systematic.

absence of services had to be taken into account. Benefits for the underemployed were calculated by deducting anticipated lifetime earnings *without* vocational rehabilitation services from total estimated lifetime earnings *after* rehabilitation. To deduct earnings for the already employed, the following modification to equation (1) was introduced: (2) $B = N\sum_{t_i=1}^{T} \overline{W} - N^*\sum_{t_i=1}^{T} \overline{W}^*$ where N^* and W^* refer to the number and earnings of those employed at the time of acceptance.

Conley (1969) and the Michigan DVR study (1970) have raised questions regarding the use of earnings reported at time of acceptance: (a) clients may either intentionally report lower incomes during the initial interview to obtain services or they may not be able to recall actual earnings; and (b) because it is probable that a client who had no earnings at acceptance had some earnings during the year prior to acceptance, use of only earnings at acceptance in the caluculation makes the increased lifetime earnings figure higher. The researchers suggested that a clearer picture would be possible if an average annual rate of earnings during a one-year period prior to acceptance was used. The Michigan study was able to obtain this figure by conducting a follow-up survey of the clients in their sample and asking questions relative to the percentage of clients who had earnings in the year prior to acceptance, the average number of weeks worked, and the average weekly amount of these earnings. Unfortunately, the present investigation did not have such figures but did take into account the percentage of clients unemployed at acceptance who were actually employable.

The number of clients who were unemployed at time of acceptance was sufficiently large to assume that the number was not indicative of either past employment circumstances or estimated future labor market activity even without the receipt of services. Therefore, it was assumed probably that a certain percentage of those unemployed at acceptance were actually employable and that these, by age categories, were: (a) 17-44 years old–18.1%; (b) 45-64 years old–7.7%; and (c) 65 and over–9.0%; it was expected that

these rates would be the same for all handicap types (*An Exploratory Cost-Benefits Analysis,* 1967, p. 21). The relevant average income at acceptance was thus a composite of those with incomes at acceptance plus imputed incomes for a portion of those unemployed at acceptance.

Improved mortality and reinjury rates. After a client has received vocational rehabilitation services, his earnings may increase not only because of better skills, attitudes, or absenteeism records, but also because the client—especially the medically handicapped—may be less likely to suffer additional injury or die. He therefore earns for a longer period of time than he would have had he not received services.

Mortality and reinjury rates will vary in respect to employment category, age and sex distributions, and other factors. Therefore, somewhat different treatments and constants for r (reinjury rate) and m (mortality rate) were applied in the benefit-cost calculations for the culturally and the medically handicapped. Greater reinjury rates could logically have been assessed against the probable earnings of those who did not receive rehabilitation services (*An Exploratory Cost-Benefits Analysis,* 1967, p. 19). However, for the purposes of this benefit-cost determination the comparatively low employment rates which had already been applied against earnings without services were assumed to be sufficiently stringent to take this reinjury factor into account. This was due to the relatively large number of clients who had reported that they were unemployed at the time of their acceptance for rehabilitation services. Therefore, the same reinjury and mortality rates were used for both time periods within groups.

For the cultural group the mortality rate used was that for the general population (using 1964 figures) because this group did not have any medically-defined handicaps. The injury (and reinjury) rate for the cultural group of clients was simply the proportion of the general population in each age group found by the National Health Survey (U.S. Department of Health, Education, and Welfare, 1965) to have become totally or partially limited in their major activity while employed.

For the medically disabled the mortality rate was adjusted upward to allow for the greater probability of death: a factor, varying from 2.01 for young workers to 1.58 for those over 40 years old, was multiplied by the mortality rate at each age level to produce the estimated mortality rate (*An Exploratory Cost-Benefits Analysis,* 1967, pp. 9-10). The rate used at each age level was one set by the Society of Actuaries to apply to insurance policies for medically-disabled persons. The reinjury rate for the medically-disabled rehabilitants was found by computing the ratio of those in the labor force who became limited in their activity in the *last year* to those in the labor force with one or more chronic conditions *(An Exploratory Cost-Benefits Analysis,* 1967, pp.13-14, 17).

Other economic factors. In addition to the possibility of reinjury or death, other economic factors affect the lifetime wages of a rehabilitated client. The three that were considered for purposes of calculation were: unemployment rate, discount rate, and increased worker productivity.

There is unfortunately no firm guarantee that a recently rehabilitated person who has received a job and who is ready and willing to work will continue to hold a job. In the U.S. there has been a minimum rate of unemployment on a national level which was estimated by the Council of Economic Advisors to be three percent (at the time of this study, 1966-68). This was an overall rate that differed according to geographic area, employment category, and socio-economic class. It was higher for the unskilled than for the skilled; it was higher for blacks than for whites; it was higher for the younger and the older worker, females, and those with little education. Any one individual may or may not be affected by unemployment, but the anticipated rate of return of any given handicap group certainly would be reduced by unemployment. In the present study, the prevailing unemployment rate of the experimental and primary control county—five percent—was used to reduce discounted lifetime earnings after closure to allow for an expected break in the earnings stream.

Use of a discount rate was necessary because benefits experienced in the future (as is the case in vocational rehabilitation) have

less value than those of today, for money possessed today can be reinvested. Also, the discount rate can be increased to account for risk and uncertainty in the outcome of a project; in other words, "a public project is profitable only if the value of the net benefits which it achieves are greater than the value of the investment opportunities which the private sector lost" (Michigan DVR, 1970, p. 32).

In addition to the anticipated lifetime earnings that come about through vocational rehabilitation, there is also the factor of increased worker productivity over time. It could be argued that being handicapped limits the activity a person can perform and thereby also limits his productivity. However, a handicapped person who has been "successfully rehabilitated" has had his handicap to employment alleviated; therefore, it was assumed that rehabilitated handicapped individuals have the same potential as non-handicapped individuals for increased productivity, especially if selective placement techniques are employed. For the past several decades, worker production per hour has been increasing at an annual rate of about three percent. If this rate of increase continues into the future, it could be anticipated that annual wages will rise three percent yearly over a working lifetime.

In the present investigation, a productivity rate of three percent, *both* at acceptance and at closure, was chosen to represent national trends. This duplication of productivity rates overlooks an assumed increase in productivity that would result from rehabilitation services. The Michigan DVR study, for example, used a productivity rate of three percent prior to rehabilitation and four percent following such services (p.64). However, because the HEW study could find "no information to confirm" an increase in productivity as a result of services and since the present investigation is based on this study, the duplication of rates is necessary (*An Exploratory Cost-Benefits Analysis,* 1967, pp. 16, 20). In addition, productivity rate is not as important in the calculations as other variables. The authors of the Michigan study conducted a sensitivity analysis and reported that two of the five most sensitive variables were (a) "rate of growth of earnings after closure" and (b) "rate of growth of earnings before closure" (p. 70), but did *not* find

productivity rates to be crucial to the computation of the benefit-cost ratio.

To introduce an unemployment rate, a discount rate, and productivity trends, equation (2) was changed to: (3) $B = N\sum_{t_i=1}^{T} \bar{W}$

$$[1-(r_{t_i} + m_{t_i} + u)]\frac{(1-p)^t}{(1-d)}t - N^*\sum_{t_i=1}^{T} \bar{W}^* \; [1-(r^*_{t_i} + m^*_{t_i} + u^*)]\frac{(1-p)^t}{(1-d)}t$$

where u and u^* are unemployment rates, p is a rate of productivity increase, and d is a discount rate. Formula (3) above is a version of that used by the Department of HEW, revised to include unemployment rates (*An Exploratory Cost-Benefits Analysis,* 1967, p. 6).

The calculations in equation (3) were applied to each person who completed the Wood County program and who was classified as belonging to one of four groups (medical rehabilitants paid and unpaid, cultural rehabilitants paid and unpaid). The results were then summed over the groups. The resultant positive benefit figures (the difference between the two discounted earnings streams) were functions of the increased average wages and decreased average unemployment rates of the rehabilitated worker, assumedly attributable to receipt of services. Typically, the rehabilitated group as a whole, although not necessarily each individual member, advances in work type from the less to the more skilled simultaneously as it advances in earning power. Persons who enter the program as unskilled and unemployed, or as housewives, or as unpaid family workers frequently become wage earners due to the positive services of vocational rehabilitation.

Non-paid Workers at Closure

It is more difficult to determine the benefits gained as a result of services for housewives and unpaid family workers; no labor market comparable to the one for paid workers exists as a guideline. Nevertheless, persons who were rehabilitated as homemakers or

unpaid family workers benefitted as much from services as those persons earning wages. Thus, a wage had to be imputed for the increased productivity of non-wage earning rehabilitants to make the benefit-cost analysis as accurate and meaningful as possible.

In dealing with this group, we no longer have, however, an objective criteria to demonstrate that vocational rehabilitation services have truly rehabilitated a person. The market test, gaining and holding a job, is absent. Nor is it possible to say what proportion of those entering a vocational rehabilitation program might be capable of undertaking full- or part-time employment at domestic tasks. The logical procedure, therefore, is to treat unpaid family workers just as if they were paid. That is, it is assumed that the number of persons who had jobs or were expected to be employed in the long run without vocational rehabilitation services, divided by the total number of workers at closure for all work disabilities, would be the same as the ratio of persons able to do domestic chores before vocational rehabilitation services to those able to perform chores after they have received services.

An additional assumption is required. A disabled household worker or a worker poorly trained at his task may perform the same quality and quantity of work before obtaining vocational rehabilitation services as afterwards, but the length of time he spends may be greatly decreased after program completion. To assign benefits to time saved in completing housework imputes a value to an individual's leisure time; however, such a value cannot easily be determined. It is necessary, then, to assume that if a person was capable of doing domestic work prior to obtaining rehabilitation, the value of work performed after he receives vocational rehabilitation services does not increase.

This treatment is conservative. However, when market prices are unavailable, a careful weighing of potential benefits is desirable. There are always program benefits that may appear relevant without close analysis, but double-counting or exaggeration must be avoided.

For unpaid cultural and medical rehabilitants the value of work at closure was based on the following formula: (4) $B = \$1832N + \$2883N'$, where N is the number of persons in the closure group who

were housewives and N' is the number closed as unpaid family workers. The imputed values for household services ($1832 and $2883) were calculated by the Department of Health, Education, and Welfare (*An Exploratory Cost-Benefits Analysis,* 1967, p. 59). The value for a housewife equals the mean earnings of a full-time maid working 40 to 52 weeks per year. The unpaid family worker value was found using the mean annual earnings of full-time workers in several occupational categories (e.g., clerical and sales, service, farmers and farm laborers) believed to cover the most probable duties of family workers.

Earnings at acceptance for non-wage earners were assumed to stand in the same proportion to the yearly value of work activity (based on activity at closure) as did the earnings at acceptance of wage earners in relation to their earnings at closure. From the data collected for the Wood County Project, this ratio was found to vary considerably among the different disability groups: WC-physical (R_1) = .42, WC-emotional (R_2) = .35, WC-mental retardate (R_3) = .20, WC-cultural (R_4) = .30; EC-physical (R_5) = .31, EC-emotional (R_6) = .25, and EC-mental retardate (R_7) = .19. Thus, (6) $B^* = R_i$ ($1832N + $2883N') where B^* refers to the benefits at acceptance and R_i refers to the ratio applicable for each handicap group from both counties (i = 1.7). The difference between B and B^*, extended over a life-time of earnings and correcting (as in formula 3) for *r*einjury, *m*ortality, *p*roductivity and *d*iscount rates (but not for *u*nemployment rate), yields the total benefit for unpaid workers from vocational rehabilitation services. This procedure was in keeping with the model used for this benefit-cost analysis. There are, of course, other options; and the reader should be aware of imaginative methods such as that used in the Michigan DVR study in which there was no breakdown into categories of "wage earners" and "non-wage earners," but a measure of the number of household members entering or leaving the labor force.

Annual productivity increases of three percent were assumed for this group just as for paid workers. This is a reasonable estimate because the increase in capital equipment that adds greatly to U.S. productivity takes place in the home as well as in industry. To the

extent that increased productivity in the home leads to shorter work hours rather than more output, benefits of vocational rehabilitation are overstated. The same discount rate was used as for the paid worker.

Benefits for the unpaid category were projected to the same retirement age as that used for employed workers. This is a conservative benefit projection to the extent that the typical housewife has a longer working life than does her employed husband. No unemployment rate was assumed after closure for the unpaid worker; this assumption tends to increase the level of benefits for unpaid workers.

Non-rehabilitants

For persons who began the vocational rehabilitation program but did not complete it, services may or may not have helped them so far as can be measured by increased lifetime earnings. It is possible that a person who received numerous program services but quit before he completed the program was better prepared for work than he was at acceptance. Yet any benefit for this group had to be closely scrutinized to make certain the benefit was directly attributable to the rehabilitation program and was not a result of sampling error. Of course, even though program drop-outs may add little or nothing to program benefits, they do increase the total cost of the program and these costs must be added to the cost of those who complete the entire program (see *Calculation of Costs* below).

Caluclation of Costs

The calculation of costs for a vocational rehabilitation program is somewhat easier than the calculation of benefits provided the researcher clearly defines *which* costs are being used. This is where the problem arises.

For example, as discussed in the literature review, Conley (1969) felt that *social* rather than *program* costs should be used in benefit-cost ratios, for simply using the direct, measurable costs does

not truly present the total cost of providing services to the handicapped. In his concept of social costs, Conley thought that costs for maintenance services to a client while in a program and that the cost of the carry-overs from one year to the next of a program should *not* be included in the cost calculation. The maintenance costs are, according to Conley, only transfer payments and not true social costs; and the cost of carry-overs is just a function of a growing program. On the other hand, there are a number of other costs that must be included for a true picture; these are services provided by parties other than rehabilitation agencies, the cost for further services to clients who were previously closed as rehabilitated, some portion of the expenditures made for previous research, training, and construction, and the amount of wages the client lost while in the process of receiving services.

The present investigation did not have the data or techniques available at the time when research was being conducted to completely adopt Conley's measure of social costs. Nevertheless, the Wood County Project was very careful to make explicit exactly which costs were being used.

Foregone earnings—the loss of wages during the period when a client was receiving vocational rehabilitation services—was not calculated as a cost for the Wood County Project, again to conform to the methodology of the HEW study. This omission is not considered to be extremely limiting, especially since the Michigan analyses did not find it to be an important variable. Nevertheless, the reader must recognize this omission as a limitation, and to this extent the benefit-cost ratios for the WCP are overstated.

To determine the resource costs of the Wood County program, the average costs per client closed were found for the period from July 1, 1966 through June 30, 1968. Total program costs per year are a less accurate indicator with a continuing program than average costs per client because many clients on whom resources had been expended remained in the program after June 30, 1968. Likewise, some individuals who were terminated during the period under consideration received services in prior periods.

An average cost procedure presents no difficulties so far as purchased services are concerned; however, when dealing with administrative costs and counselor salaries, a problem appears. Actual cost figures for expenditures on each client were recorded, but overhead expenses generally applicable to the entire program must as well be allocated to each client. In Wisconsin, the typical vocational rehabilitation agency's costs (at the time the research was conducted) were 82% related to outside purchases and 18% administrative, including salaries (U.S. Department of Health, Education, and Welfare, 1968). This ratio was used in the present investigation to determine overhead expenses to be allocated. It was assumed that Wood County, after expansion of services, continued to fit the typical agency pattern. It was further assumed that a perfect market for vocational rehabilitation personnel and goods existed, such that the wages and prices paid represented correctly the real resource costs involved.

Accepting the above assumptions, direct purchased service costs were summed for each handicap group and means were found; the cost of purchased services for each group was then known. It was also known that 82% of the total costs were equal to the cost of purchased services. Therefore, the cost of purchased services was divided by .82 to yield the total cost of services per person for each group. (It should be noted that experimental programs typically have far higher costs, especially in their initial years of operation, than do more routine programs. The procedure used here assumed that these research and demonstration costs were not applicable to a normalized program.)

Since individual data were utilized, it was possible to remove one potential source of error in this analysis. It was found that some persons were provided services and terminated more than once in the two-year period under consideration. To make separate acceptance-closure calculations of benefits and costs on each occasion would be unrealistic. Thus, earnings at initial acceptance were compared to those at final closure for each of these multiple closures. The cost of services was the total direct costs attributable to the client during *all* periods of receipt of services.

Costs for one group—those who dropped out of the program after acceptance and after receiving some amount of services—were ignored until the very end of the project. They were than calculated for the ratios. Inclusion of these costs does reduce the ratios found in this report without a corresponding benefit offset. The benefit-cost calculations are, therefore, understated to the extent that partial benefits are neglected even though these benefits may be relatively small (*An Exploratory Cost-Benefits Analysis,* 1967, p. 39).

When calculating the costs of a program, the question of whether to include public assistance payments arises. The Michigan DVR study (1970) included the amount of assistance payments made to clients during periods of training and other stages of the rehabilitation process as part of income loss due to training. The authors' rationale was that because an individual was unable to work and earn an income while in training and consequently needed maintenance payments for this period of time, the amount of assistance paid to the client should be added to the cost of rehabilitation. On the other hand, Conley (1969) and the HEW study did *not* include the amount of public assistance paid to clients while in training as a cost. Conley argued that "maintenance allotments are, of course, transfer payments and not true social costs" (p. 240). In conforming to the methodology of the analysis conducted by the Department of HEW, the present investigation did not include public assistance costs in the computation of benefit-cost ratios. Thus, costs in the present investigation were underestimated by the average amount of such assistance [the average cost for each client receiving assistance (10% of the total sample) was $155.55 for the Michigan DVR study (p. 65)]. In addition, because the reduction in public assistance payments as a result of rehabilitation services was not included as a benefit, the benefit-cost ratios of the Wood County Project were understated. Finally, the authors of the Michigan DVR study reported that changes in assistance payments were not as sensitive in altering benefit-cost ratios as were alterations in earnings rates. The components of the benefit-cost model and their values used in this investigation can be seen in the Appendix to this report.

Reduction of Public Assistance Payments

The second aspect of the economic analysis of the Wood County Project was concerned with the reduction in public assistance payments to vocational rehabilitation clients. The purpose of the public assistance analysis was to determine if the expansion of resources and eligibility criteria in Wood County resulted in a reduction in the amount expended for public assistance and to estimate the amount of percentage of such reduction.

Procedurally, the researchers' initial task was to obtain a meaningful estimate of the mean amount of money a typical public assistance recipient received in any 12-month period. Unfortunately, the state and county Department of Public Welfare records indicated only the total number of cases for each month. Therefore, if an individual receiving Medical Assistance was on the welfare rolls for only seven months in one year, for example, he would have been counted as seven cases on a per month basis. Individuals who receive Aid to the Blind, Old Age Survivors Insurance benefits, or Aid to Families with Dependent Children, however, are typically on the welfare rolls for extended periods of time, i.e., for a year or more. These individuals, then, could potentially be counted as many as 12 times during a year on a per month basis. Because the present investigation was concerned with the average annual amount of public assistance received by a typical *individual* recipient and not with the number of *cases,* methods were developed to meaningfully interpret the state and county records.

The most simple and direct method would have been to total the number of cases for each year and to merely divide this sum into the total amount of expenditures. However, the result of this method would have been the mean annual amount any *case* received. Because any one individual could have been listed many times as "a case" in the Department of Public Welfare records, the resulting amount would have represented only a fraction of what the typical public assistance recipient actually received in a year. Too, such a simplified method tends to disregard the variability of the amounts paid for different types of assistance (e.g., amounts paid for Aid to the Blind

are typically lower than those paid for Aid to Families with Dependent Children).

After considerable discussion with Public Welfare administrators in Wood County and with the Project research staff, it was decided that a more realistic estimate could be obtained by using a different and more sophisticated method. The state and county records stated the number of cases in each month. These were summed for a 12-month period and the total was then divided by 12 to give the mean number of cases (MC) per month; it was assumed, at this point, that each case represented as closely as possible (given the data available) an individual recipient. The assumption, of course, overlooks the length of time individuals actually received some type of assistance during the 12-month period. However, since the majority of individuals (according to the manner in which records were kept) had been listed on the welfare rolls many times during the 12-month period, this method would assure that each individual was counted only once. The resulting dividend, MC, was the mean number of recipients per month.

Also stated in the state and county Public Welfare records were the total monthly amounts paid out to all of the cases listed for each month by type of assistance. The monthly amounts for each type of assistance were summed to obtain the total amount spent for the 12-month period on the total number of cases. This sum was then divided by 12 to yield the total mean amount (MA) spent per month for the assistance recipients. The mean amount per month, MA, was then divided by the mean number of recipients per month, MC, to determine the mean amount per month spent for each recipient (MA/MC) for each type of assistance. To convert this figure to years, it was multiplied by 12 to obtain the mean amount spent per year for any one public assistance recipient, i.e., 12(MA/MC). Having thus determined a method for establishing a usable estimate of the mean annual cost per typical recipient for any type of assistance, these figures were then derived for the three fiscal years (1963-64, 1964-65, and 1965-66) prior to the period of time under investigation. These mean annual amounts for each type of assistance were

summed and divided by three, yielding a mean annual amount for each type of assistance.

Five types of public assistance were investigated: General Assistance (GA), Aid to the Permanently and Totally Disabled (APTD), Old Age Survivors Insurance (OASI), Aid to Families with Dependent Children (AFDC), and Aid to the Blind (AB). The mean annual costs per typical recipient, 12(MA/MC), for each category were very similar—$1,487, $1,303, $1,357, $1,762, and $1,197, respectively. These mean amounts were then summed and divided by five to obtain a resultant value of $1,421; this figure was determined to be the most appropriate estimate of the mean annual cost per "typical" recipient, regardless of the type of public assistance. This figure compares very favorably with that used in the Michigan DVR study: projecting their monthly figure to an annual figure, the mean annual cost was $1,615 per recipient (p. 64).

Once the mean annual cost per typical recipient had been determined, the Wood County Department of Public Welfare records were scrutinized to determine how many of the clients rehabilitated by the Wood County DVR office had received any form of public assistance in the three years prior to acceptance for rehabilitation services. It was suspected that many individuals who apply for rehabilitation services fail to report, or report inaccurately, the amounts of public assistance they may be receiving at this time. The reasons for such client behavior have been reported in the literature review. This suspicion was confirmed; inspection of the Public Welfare records revealed that a high percentage of rehabilitated clients had been "chronic" welfare recipients; i.e., they had received assistance for long periods of time or had been on and off the welfare rolls frequently. Thus, the percentage of individuals who had received public assistance prior to acceptance was much higher than would have been the case had only the DVR records been used.

Each of the rehabilitated clients in Wood County of the 1966-67 fiscal year were categorized by handicap type, viz., culturally handicapped, mentally retarded, emotionally disturbed, and physically disabled. The number in each group who had received

public assistance prior to acceptance was then multiplied by the mean annual public assistance cost per typical recipient ($1,421) to determine the estimated mean annual cost of assistance (and to the public) before the receipt of services. The number of rehabilitated clients (by handicap type) still receiving public assistance at the date of closure was also multiplied by $1,421. These two figures (for each handicap category) were then compared to compute the estimated amount and percentage of reduction in public assistance payments assumedly attributable to the receipt of vocational rehabilitation services.

RESULTS

This study was an economic evaluation of the Wood County Project and of the effectiveness of the experimental program which extended vocational rehabilitation services across the entire spectrum of the vocationally handicapped. Special attention was given to the progress of the culturally disadvantaged included in the program. The economic impact of the program was measured in two ways, the results of which are presented in this chapter: (a) a benefit-cost analysis of the expanded program, and (b) a study of the relationship between the program and a decrease in public assistance payments to rehabilitation clients.

Benefit-Cost Analysis

Description of the Sample

For the period of time under investigation, there were 988 rehabilitants in the two research areas: 772 in Wood County (including 225 culturally-handicapped rehabilitants) and 216 in the principal control agency (Eau Claire County). There were also 45 individuals (30 in Wood County and 15 in Eau Claire County) who had been accepted for services in the two agencies but who subsequently failed to complete the program for various reasons (see Table 1).

The rehabilitants were classified as "workers" (wage earners) and "homemakers and unpaid family workers" (non-wage earners). The number of workers and homemakers and unpaid family workers for each client group is presented in Table 1. There was a greater proportion of wage earners than non-wage earners in each client group; the Eau Claire mentally-retarded group had the lowest percentage of wage earners—71%—whereas the Eau Claire emotionally-disturbed group had the highest percentage—89%. Workers comprised 83% of the Wood County culturally-handicapped group of rehabilitants.

Table 1

Rehabilitated and Non-rehabilitated Clients by County and Handicap Type

Handicap Type	Wood County Rehab.	Wood County NR	Eau Claire County Rehab.	Eau Claire County NR
Physical				
Remunerated Workers	287 (73.6%)	10	90 (81.8%)	5
Homemakers and Unpaid Family Workers	103 (26.4%)	2	20 (18.2%)	1
Emotionally Disturbed				
Remunerated Workers	80 (83.3%)	6	63 (88.7%)	8
Homemakers and Unpaid Family Workers	16 (16.7%)	0	8 (11.3%)	0
Mentally Retarded				
Remunerated Workers	48 (78.7%)	4	25 (71.4%)	1
Homemakers and Unpaid Family Workers	13 (21.3%)	0	10 (28.6%)	0
Cultural				
Remunerated Workers	187 (83.1%)	7	– –	–
Homemakers and Unpaid Family Workers	38 (16.9%)	1	– –	–
TOTAL				
Remunerated Workers	602 (78.0%)	27	178 (82.4%)	14
Homemakers and Unpaid Family Workers	170 (22.0%)	3	38 (17.6%)	1

Benefits

Benefits were measured in terms of the incremental lifetime earnings increase attributable to the receipt of rehabilitation services (see *Methodology*). These calculations were based on earnings at acceptance and at closure. Tables 2 through 5 illustrate the mean earnings before and after vocational rehabilitation services for all clients rehabilitated in Wood and Eau Claire counties for the period of investigation. The tables have been arrayed by handicap type and sex, giving the number of wage earners in each earnings category and mean salary in dollars per week and per year.

Wood County. Of special interest in Table 2 is the relatively small number of wage earners in Wood County at acceptance; although this is especially true for those rehabilitants in the mentally-retarded category, it was generally observed that earnings at acceptance were quite low for all handicap groups. Earnings of males exceeded those of females at acceptance for all handicap groups except for the retarded.

The earnings of Wood County rehabilitants at closure are presented in Table 3. Average earnings were quite similar for the physically handicapped and emotionally disturbed, with about a $30 difference in weekly earnings between male and female workers. The average earning for the culturally-handicapped males were similar to those for the other disabled males; on the other hand, the average earnings for the culturally-handicapped females were at least $10 per week higher than those for the other disabled females. The mentally-retarded rehabilitants had earnings at closure which were approximately $30 lower per week than clients of the other handicap groups. All client groups—with the exception of the emotionally-disturbed males—had higher mean weekly earnings following rehabilitation than prior to it; nevertheless, nearly four times as many emotionally-disturbed males were employed at closure than at acceptance.

Eau Claire County. The number of Eau Claire medically-handicapped clients (there were no culturally-handicapped clients served in the principal control county) in each earnings category and

Table 2

Earnings for All Clients with Earnings at Acceptance; By Handicap Type and Sex, Wood County, Closures 7-1-66 to 6-30-68

Earnings Weekly Earnings ($)	Earnings Midpts ($)	Handicap type and Sex: Physical Male n	Physical Male $/wk.	Physical Female n	Physical Female $/wk.	Emotionally Disturbed Male n	Emotionally Disturbed Male $/wk.	Emotionally Disturbed Female n	Emotionally Disturbed Female $/wk.	Mentally Retarded Male n	Mentally Retarded Male $/wk.	Mentally Retarded Female n	Mentally Retarded Female $/wk.	Cultural Male n	Cultural Male $/wk.	Cultural Female n	Cultural Female $/wk.
0–9	5.00	–	–	1	5.00	–	–	–	–	–	–	–	–	1	5.00	–	–
10–19	14.50	8	116.00	–	–	–	–	–	–	1	14.50	2	29.00	–	–	–	–
20–29	24.50	5	122.50	4	98.00	–	–	1	24.50	–	–	–	–	1	24.50	5	122.50
30–39	34.50	4	138.00	3	103.50	–	–	1	34.50	–	–	–	–	2	69.00	2	69.00
40–49	44.50	3	133.50	4	178.00	1	44.50	–	–	–	–	–	–	–	–	3	133.50
50–59	54.50	7	381.50	1	54.50	2	109.00	–	–	–	–	–	–	4	218.00	1	54.50
60–69	64.50	8	516.00	1	64.50	3	193.50	–	–	–	–	–	–	4	258.00	1	64.50
70–79	74.50	12	894.00	2	149.00	1	74.50	–	–	–	–	–	–	3	323.50	1	74.50
80–89	84.50	7	591.50	1	84.50	1	84.50	1	84.50	–	–	–	–	1	84.50	–	–
90–99	94.50	8	756.00	–	–	2	189.00	–	–	–	–	–	–	4	378.00	–	–
100–109	104.50	7	731.50	–	–	3	313.50	–	–	–	–	–	–	2	209.00	–	–
110–119	114.50	1	114.50	–	–	1	114.50	–	–	–	–	–	–	–	–	–	–
120–129	124.50	4	498.00	–	–	1	124.50	–	–	–	–	–	–	–	–	–	–
130–139	134.50	2	269.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–
140–149	144.50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
150–159	154.50	1	154.50	–	–	–	–	–	–	–	–	–	–	–	–	–	–
160–169	164.50	1	164.50	–	–	–	–	–	–	–	–	–	–	–	–	–	–
170–179	174.50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTALS		78	5581.00	17	737.00	15	1247.50	3	143.50	1	14.50	2	29.00	22	1469.50	13	518.50
Mean Weekly Earnings			71.55		43.35		83.17		47.83		14.50		14.50		66.80		39.88
Mean Yearly Earnings			3578.00		2168.00		4158.00		2392.00		725.00		725.00		3340.00		1994.00

Table 3

Earnings for All Clients with Earnings at Closure; By Handicap Type and Sex, Wood County, Closures 7-1-66 to 6-30-68

Earnings		Handicap Type and Sex															
Weekly	Earnings	Physical				Emotionally Disturbed				Mentally Retarded				Cultural			
Earnings	Midpt.	Male		Female		Male		Female		Male		Female		Male		Female	
($)	($)	n	$/wk.	n	$/wk.	n	$/wk.	n	$/wk.	n	$/wk.	n	$/wk.	n	$/wk.	n	$/wk.
0–9	5.00	–	–	1	5.00	–	–	–	–	–	–	–	–	1	5.00	–	–
10–19	14.50	8	116.00	4	58.00	1	14.50	2	29.00	2	29.00	2	29.00	1	14.50	1	14.50
20–29	24.50	10	245.00	17	416.00	1	24.50	2	49.00	8	196.00	3	73.50	5	122.50	5	122.50
30–39	34.50	7	241.50	4	138.00	3	103.50	1	34.50	5	172.50	–	–	4	138.00	6	207.00
40–49	44.50	11	489.50	8	356.00	4	178.00	2	89.00	5	222.50	1	44.50	6	267.00	12	534.00
50–59	54.50	8	436.50	13	708.50	8	436.00	6	327.00	5	272.50	1	54.50	9	490.50	14	763.00
60–69	64.50	17	1096.50	13	838.50	6	387.00	5	322.50	7	451.50	2	129.00	10	645.00	18	1161.00
70–79	74.50	31	2309.50	7	521.50	8	596.00	4	298.00	4	298.00	1	74.50	15	1117.50	18	1341.00
80–89	84.50	25	2112.50	5	422.50	8	676.00	–	–	1	84.50	–	–	13	1098.50	10	845.00
90–99	94.50	14	1323.50	–	–	3	283.50	1	94.50	1	94.50	–	–	10	945.00	5	472.50
100–109	104.50	24	2508.00	5	522.50	3	313.50	–	–	–	–	–	–	3	313.50	3	313.50
110–119	114.50	16	1832.00	1	114.50	3	343.50	–	–	–	–	–	–	5	572.50	2	229.00
120–129	124.50	19	2365.50	1	124.50	6	747.00	–	–	–	–	–	–	1	124.50	–	–
130–139	134.50	8	1076.00	–	–	2	269.00	–	–	–	–	–	–	5	672.50	–	–
140–149	144.50	2	289.00	1	144.50	–	–	–	–	–	–	–	–	–	–	–	–
150–159	154.50	3	463.50	–	–	–	–	–	–	–	–	–	–	3	463.50	–	–
160–169	164.50	3	493.50	–	–	–	–	–	–	–	–	–	–	–	–	–	–
170–179	174.50	–	–	–	–	–	–	–	–	–	–	–	–	2	349.00	–	–
180–189	184.50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
190–199	194.50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
200–209	204.50	–	–	–	–	1	204.50	–	–	–	–	–	–	–	–	–	–
TOTALS		206	17396.50	80	4371.00	57	4576.50	23	1244.00	38	1821.00	10	405.00	93	7339.00	94	6003.00
Mean Weekly Earnings			84.45		54.63		80.29		54.07		47.92		40.50		78.91		63.86
Mean Weekly Earnings			4223.00		2732.00		4014.00		2703.00		2396.00		2025.00		3946.00		3193.00

Table 4

Earnings for All Clients with Earnings at Acceptance; By Handicap Type and Sex, Eau Claire County, Closures 7-1-66 to 6-30-68

Earnings Weekly Earnings ($)	Earnings Midpt. ($)	Handicap Type and Sex: Physical Male n	Physical Male $/wk.	Physical Female n	Physical Female $/wk.	Emotionally Disturbed Male n	Emotionally Disturbed Male $/wk.	Emotionally Disturbed Female n	Emotionally Disturbed Female $/wk.	Mentally Retarded Male n	Mentally Retarded Male $/wk.	Mentally Retarded Female n	Mentally Retarded Female $/wk.
0–9	5.00	–	–	–	–	–	–	–	–	–	–	–	–
10–19	14.50	1	14.50	–	–	–	–	–	–	–	–	–	–
20–29	24.50	5	122.50	–	–	–	–	–	–	–	–	–	–
30–39	34.50	2	69.00	–	–	–	–	–	–	–	–	–	–
40–49	44.50	–	–	–	–	–	–	2	89.00	–	–	–	–
50–59	54.50	1	54.50	–	–	–	–	1	54.50	–	–	–	–
60–69	64.50	1	64.50	1	64.50	1	64.50	–	–	–	–	–	–
70–79	74.50	–	–	–	–	–	–	–	–	–	–	–	–
80–89	84.50	1	84.50	–	–	1	84.50	–	–	–	–	–	–
90–99	94.50	1	94.50	–	–	1	94.50	–	–	–	–	–	–
100–109	104.50	1	104.50	–	–	–	–	–	–	–	–	–	–
110–119	114.50	–	–	–	–	–	–	–	–	–	–	–	–
120–129	124.50	1	124.50	–	–	–	–	–	–	–	–	–	–
130–139	134.50	–	–	–	–	–	–	–	–	–	–	–	–
140–149	144.50	–	–	–	–	–	–	–	–	–	–	–	–
150–159	154.50	–	–	–	–	–	–	–	–	–	–	–	–
160–169	164.50	–	–	–	–	–	–	–	–	–	–	–	–
170–179	174.50	1	174.50	–	–	–	–	–	–	–	–	–	–
TOTALS		15	907.50	1	64.50	3	243.50	3	143.50	0	0	0	0
Mean Weekly Earnings			60.50		64.50		81.17		47.83		0		0
Mean Yearly Earnings			3025.00		3225.00		4058.00		2392.00		0		0

Table 5

Earnings for All Clients with Earnings at Closure; By Handicap Type and Sex, Eau Claire County, Closures 7-1-66 to 6-30-68

Earnings Weekly Earnings ($)	Earnings Midpt. ($)	Handicap Type and Sex: Physical Male n	Physical Male $/wk.	Physical Female n	Physical Female $/wk.	Emotionally Disturbed Male n	Emotionally Disturbed Male $/wk.	Emotionally Disturbed Female n	Emotionally Disturbed Female $/wk.	Mentally Retarded Male n	Mentally Retarded Male $/wk.	Mentally Retarded Female n	Mentally Retarded Female $/wk.
0-9	5.00	3	15.00	3	15.00	–	–	1	5.00	2	10.00	–	–
10-19	14.50	4	58.00	1	14.50	1	14.50	2	29.00	2	29.00	–	–
20-29	24.50	6	147.00	1	24.50	–	–	–	–	2	49.00	1	24.50
30-39	34.50	6	207.00	2	69.00	–	–	2	69.00	4	138.00	–	–
40-49	44.50	3	133.50	1	44.50	2	89.00	3	133.50	–	–	2	89.00
50-59	54.50	3	163.50	1	54.50	6	327.00	4	218.00	10	545.00	2	109.00
60-69	64.50	7	451.50	1	64.50	3	193.50	9	580.50	–	–	–	–
70-79	74.50	4	298.00	4	298.00	6	447.00	3	323.50	–	–	–	–
80-89	84.50	12	1014.00	–	–	2	169.00	–	–	–	–	–	–
90-99	94.50	6	567.00	–	–	3	283.50	–	–	–	–	–	–
100-109	104.50	7	731.00	–	104.50	4	418.00	3	313.50	–	–	–	–
110-119	114.50	2	229.00	1	–	2	229.00	1	114.50	–	–	–	–
120-129	124.50	8	996.00	–	–	2	249.00	3	373.50	–	–	–	–
130-139	134.50	–	–	–	–	–	–	–	–	–	–	–	–
140-149	144.50	1	144.50	–	–	–	–	–	–	–	–	–	–
150-159	154.50	–	–	–	–	–	–	–	–	–	–	–	–
160-169	164.50	2	329.00	–	–	1	164.50	–	–	–	–	–	–
170-179	174.50	1	174.50	–	–	–	–	–	–		–	–	–
TOTALS		75	5658.50	15	689.00	32	2584.00	31	2060.00	20	771.00	5	223.00
Mean Weekly Earnings			75.45		45.93		80.75		66.45		38.55		44.50
Mean Yearly Earnings			3773.00		2297.00		4038.00		3323.00		1928.00		2225.00

mean weekly and yearly earnings are presented in Tables 4 and 5. The number of persons earning wages at closure as compared to the number earning wages at acceptance was increased eightfold; higher average weekly salaries were also achieved in most categories. Exceptions are the physically-handicapped females and the emotionally-disturbed males. However, because only one physically-handicapped female and three emotionally-disturbed males reported earnings at acceptance, true differences between salaries at acceptance and closure for these groups could not be meaningfully determined.

Costs

Tables 6 and 7 include the cost data for the non-rehabilitated and rehabilitated clients in Wood and Eau Claire counties. To make the benefit-cost ratios as accurate as possible, the amount of money spent on those clients who were not rehabilitated was added to the total cost for the rehabilitants (Table 6). Therefore, the per-client average total cost for each handicap group (Table 7) includes the amount spent on the non-rehabilitated clients.

The Wood County agency spent $189 more per client on the average than the Eau Claire agency for the physically-handicapped group ($891.50 versus $702.51) and $275 more per client on the average for the emotionally-disturbed group ($1,059.46 versus $784.30). However, the average per-client costs for the mentally-retarded group were $663 less for Wood County than for Eau Claire County ($948.63 versus $1,611.49).

Moreover, the Wood County agency was at this time rehabilitating 225 culturally-handicapped individuals. And the average per-client cost for this group was considerably less than for any of the other handicap groups in either county. As compared to the medically-handicapped groups in Wood County, the cost for rehabilitating the culturally handicapped was from $225 to $395 less on the average per client. As compared to the handicap groups in Eau Claire, this cost was from $38 to $947 less on the average per client. Presumably the cost of rehabilitating the cultural clients was less

Table 6

Program Costs for Non-rehabilitated Closures, Allocated to Rehabilitants

	Wood County				Eau Claire County			
Handicap Type	No. of Non-rehab.	Total Cost for Non-rehab.	No. of Rehab.	Avg. Cost per Rehab.	No. of Non-rehab.	Total Cost for Non-rehab.	No. of Rehab.	Avg. Cost per Rehab.
Wage Earners								
Physical	10	$2,263.49	287	$ 7.92	5	$ 948.49	90	$10.54
Emo. Dist	6	1,705.82	80	21.32	8	4,083.54	63	64.82
Ment. Ret.	4	1,464.60	48	30.51	1	92.60	25	3.74
Cultural	7	360.24	187	1.93	–	–	–	–
Homemakers & Unpaid Family Workers								
Physical	2	$ 485.60	103	$ 4.62	1	$ 752.27	20	$37.62
Emo. Dist.	0	–	16	–	0	–	8	–
Ment. Ret.	0	–	13	–	0	–	10	–
Cultural	1	15.00	38	.39	–	–	–	–
All Clients								
Physical	12	$2,749.09	390	$ 7.05	6	$1,900.76	110	$15.46
Emo. Dist.	6	1,705.82	96	17.77	8	4,083.54	71	57.51
Ment. Ret.	4	1,464.60	61	24.01	1	92.60	35	2.65
Cultural	8	375.24	225	1.67	–	–	–	–

Table 7

Benefit-Cost Ratios for Wood and Eau Claire County Vocational Rehabilitation Programs: Closures, 7-1-66 through 6-30-68

Handicap Class by Closure Type	Wood County N	Av. Wages at A[a] ($)	Av. Wages at C[b] ($)	Inc. Wages[c] ($)	Total Costs ($)	B–C Ratios	Eau Claire County N	Av. Wages at A[a] ($)	Av. Wages at C[b] ($)	Inc. Wages[c] ($)	Total Costs ($)	B–C Ratios
Wage Earners												
Physical	287	14,788	39,030	24,242	1,044.88	23.20	90	9,529	36,438	26,909	710.74	37.86
Emo. Dist.	80	15,886	40,595	24,708	1,121.45	22.03	63	10,380	44,368	33.988	846.89	40.13
Ment. Ret.	48	2,477	30,660	28,183	1,016.53	27.72	25	1,372	25,423	24,051	1,783.85	13.48
Cultural	187	18,420	70.094	51,674	747.98	69.08	–	–	–	–	–	–
Homemakers & Unpaid Family Workers												
Physical	103	7,076	18,445	11,378	464.13	24.51	20	12,859	21,140	8,281	665.52	12.44
Emo. Dist.	16	9,321	27,163	17,841	749.48	23.80	8	13,643	28,573	14,930	291.50	51.21
Ment. Ret.	13	6,752	37,315	30,563	697.84	43.79	10	4,973	45,924	40,951	1,181.41	34.66
Cultural	38	20,788	40,048	19,260	256.02	75.23	–	–	–	–	–	–
All Clients												
Physical	390	12,749	33,593	20,844	891.50	23.38	110	10,134	33,657	23,523	702.51	33.48
Emo. Dist.	96	14,792	38,356	23,564	1,059.46	22.24	71	10,748	42,588	31,840	784.30	40.60
Ment. Ret.	61	3,388	32,078	28,690	948.63	30.24	35	2,401	31,288	28,887	1,611.49	17.93
Cultural	225	18,820	65,020	46,200	664.69	69.51	–	–	–	–	–	–

a = Life-time wages at acceptance b = Life-time wages at closure c = Increased life-time wages

because few, if any, expensive medical services were required (if such services had been indicated at the time of acceptance, the client would have been classified as belonging to one of the medical handicap groups).

Benefit-Cost Ratios

The most interesting and important results of this study are shown in Table 7. Benefit-cost ratios were generated and are presented for Wood and Eau Claire counties by handicap type for both wage earners and non-wage earners.

For all clients rehabilitated in Wood County, the greatest increase in projected lifetime earnings per dollar invested in their rehabilitation was found for the culturally-handicapped group. When all cultural rehabilitants were considered collectively, a benefit-cost ratio of nearly 70 to 1 was found (75 to 1 for homemakers and unpaid family workers and 69 to 1 for wage earners). This means, of course, that for every dollar spent on their vocational rehabilitation, the culturally handicapped can be expected to increase their lifetime, taxable earnings by $70. This is indeed an impressive result. The high benefit-cost ratio for the cultural clients was a function of two factors: high projected lifetime earnings and low rehabilitation costs. The projected lifetime earnings were higher because the average cultural rehabilitant was younger than medically-handicapped rehabilitants and because the probabilities of mortality and injury were lower. The costs were low because the cultural clients did not need expensive medical services.

In Wood County, the benefit-cost ratios were higher for homemakers and unpaid family workers than for wage earners in all handicap groups, but this difference was small except in the case of the mentally retarded where the difference was approximately 16 ratio points. However, there were relatively few mentally-retarded homemakers and unpaid family workers which makes this difference suspect and is probably due to sampling error.

There were fewer rehabilitants (see Table 7) in Eau Claire County (the control agency) during the period under study than in Wood County; therefore the highest benefit-cost ratio for all

rehabilitants in Eau Claire County was obtained for the emotionally disturbed (40 to 1); second highest was for the physically handicapped (33 to 1); and the lowest ratio was within the mentally-retarded group (17 to 1). Ratios for the Eau Claire homemakers and unpaid family workers in the emotionally-disturbed and mentally-retarded groups were higher than for the wage earners; the reverse was true for the physically-handicapped group. While no formal statistical tests of significance were conducted, ratios for the three medical handicap classifications between the two counties appear reasonably similar, considering the small numbers of rehabilitants in some cells.

Reduction in Public Assistance Payments

The results of the analysis which was used to examine the reduction of public assistance payments made to clients rehabilitated in Wood County during the 1966-67 fiscal year are presented in Table 8. Of the sample of 453 former clients, 62% (or 279 clients) were chronic welfare recipients, i.e., they had received public assistance prior to or at acceptance for rehabilitation services. These clients represented an estimated annual cost to the public of $396,565 before rehabilitation. At the end of the rehabilitation process and at successful closure, only five percent (or 23 clients) were still receiving public assistance at an estimated annual cost of $32,692. The total annual amount of assistance was thus reduced $363,873—a 91% reduction in annual public assistance expenditures.

When the total number of clients was examined by handicap type, it was seen that the culturally and physically handicapped represented the greatest financial burden to the public before rehabilitation, costing an estimated $160,616 and $166,301 per year, respectively. Following rehabilitation, payments to the culturally handicapped were reduced by 94% and to the physically handicapped by 87%. As can be seen in Table 8, a substantial reduction in public assistance payments was attained in each of the handicap categories. Clearly, the impact of rehabilitation services was substantial in relieving client dependency and reducing the burden of the taxpayers' support for public assistance in Wood County.

Table 8

Reduction of Public Assistance for Rehabilitated Clients
in Wood County by Handicap Type

Handicap Type	Number Rehabilitants in Wood County 1966-67	Number Receiving P.A. Prior to Acceptance	Percent Receiving P.A. Prior to Acceptance	Estimated Annual Cost to Public[1]	Number Receiving P.A. at Closure	Percent Receiving P.A. at Closure	Estimated Annual Cost to Public[1]	Reduction Of Annual Cost to Public	Percent Decrease in Av. Annual Cost to Public
Cultural	162	113	69	$160,616	6	4	$ 8,528	$152,088	94
Physical	208	117	57	166,301	15	4	21,321	144,981	87
Emo. Dist.	45	30	66	42,641	2	4	2,843	39,799	95
Ment. Ret.	38	19	50	27,006	2	5	2,843	24,163	89
TOTAL	453	279	62	$396,564	25	5.5	35,535	361,031	91

[1]Based on the estimated average annual cost of a "typical" public assistance recipient, $1,421.

The methodology utilized in computing the reduction of public assistance was not without limitations, however. First of all, the manner in which the annual cost per typical recipient was calculated must be cited as a limitation; this figure ($1,421) must be seen as only an estimate and subject to possible inaccuracy since it was necessary to derive this figure from several repeated means or averages. However, the resulting *amount* per typical recipient was not considered as essential to the results as the *percentage* of decrease in public assistance payments; the percentage of reduction would remain the same regardless of the estimated amount used, since the actual amount per typical recipient was used as a constant.

The other limitation worthy of note concerns the manner in which the number of public assistance recipients prior to acceptance was calculated. This is not so much a limitation as it is a methodological characteristic which must be considered when interpreting the results. Despite the above limitations the reduction of public assistance payments to these rehabilitated clients must be considered further substantiating evidence of the economic impact of vocational rehabilitation services.

CONCLUSIONS AND IMPLICATIONS

The important results of the economic analysis of the impact of the Wood County Project are identified in this section. And more crucial, the implications of the results for rehabilitation programs and practices are discussed. Such explanations, of course, are limited and subject to error. In the present study, however, the objective nature of the data has reduced the possibility of misinterpretation.

The first major conclusion of this study was that the management technique of benefit-cost analysis could be meaningfully applied to an operating vocational rehabilitation agency: the analytical procedures involved are appropriate and feasible and the results provide tangible information about the efforts of the agency. Through benefit-cost analysis, it is possible to assess the economic desirability and worth of vocational rehabilitation as a public service. It also provides data for comparisons with other public programs, comparisons of different treatment systems as well as specific services (e.g., vocational training), and evaluation of differences in client groups (e.g., by type of handicap, age, etc.) as to choice of agency services and predicted change. The implication is, of course, that benefit-cost analysis can be used by rehabilitation administrators for assistance in program planning and budgeting and for formulating guidelines for differential provisions of client services. (This is not to minimize humanitarian considerations in the decision-making process, but it must be recognized that economic and human values need not be mutually exclusive or incompatible; further, if vocational rehabilitation is to be adequately supported by the public, its social desirability must be documented.)

Prior to a discussion of conclusions and their implications drawn from the specific results of this investigation, it is important to point out limitations which restrict the generalizability of the results. The methodological considerations described in detail previously (including the literature review) must be recognized. Perhaps the most serious problem in generalizing results stems from the characteristics of the Wood County population: it is predominantly white and rural. This sampling problem is discussed in detail in

Wright, Reagles, and Butler (1970). The culturally handicapped of Wood County, however, share many of the same problems and unrealized potential for rehabilitation as poor people of other races and in other areas of the country. Furthermore, it is believed that the sampling deficits have been compenstated for by the conservative benefit-cost model used in this study.

The present investigation found that it would be economically advantageous to the nation to expand vocational rehabilitation services vertically to include all presently eligible medically-handicapped persons who do not now receive help simply because of inadequate resources (funds, facilities, and personnel) for rehabilitation. Indeed, this benefit-cost analysis revealed that for every dollar of public funds spent for the vocational rehabilitation of this group, over $25 would be returned in increased, taxable lifetime earnings.

The most important finding of this study was in regard to the extension of eligibility to provide vocational rehabilitation services to the culturally handicapped. As a conservative estimate, $70 in increased lifetime earnings is the anticipated gain for every dollar spent for the vocational rehabilitation of this new client group. Thus, it may be concluded that it would be even more advantageous to the nation to extend established, proven rehabilitation techniques to dependent persons not now eligible or served but who need help with vocational adjustment due to nonmedical reasons—financial or educational deficit or prejudice. A systematic bias assists in explaining the overwhelmingly more favorable benefit-cost ratio for the culturally-handicapped group. This group was predominantly composed of younger persons who, therefore, had more years to earn than the older clients. Moreover, their handicapping condition—cultural disadvantagement—precludes the necessity of case service costs for medical restoration services. In addition, these clients tended to have greater physical, emotional, mental and educational capability for employment than traditional (medical) clients.

The results of the reduction in public assistance expenditure study documents the effectiveness of the vocational rehabilitation process in dealing with dependency. Before rehabilitation, 69% of the culturally handicapped and 57% of the medically handicapped

were identified as periodic or chronic welfare recipients; following services, only 4% of the culturals and 7% of the medicals were receiving public assistance payments. This represented a reduction in the amount of assistance of 94% and 87%, respectively.

It can therefore be concluded that rehabilitation services were effective in relieving client dependency and reducing the burden of taxpayers' support for public assistance. Since all of the culturally handicapped included in this study were potentially dependent persons, the implication of these results has great meaning for the collaboration of public welfare and vocational rehabilitation agencies. It is, of course, recognized that not all recipients of public assistance can be made capable of self-support; others—such as mothers whose children depend upon their care—may have a more important contribution to society than remunerative employment. Still, the Wood County Project conclusively demonstrated that through collaboration of public welfare and vocational rehabilitation agencies, public assistance expenditures can be reduced by concentrating allocations upon the non-continuing costs of effecting the vocational adjustment of work-age and otherwise capable recipients. For a nation concerned about the priorities accorded the distribution of its tax dollars, this economic analysis documents the viability of the state-federal program of vocational rehabilitation as a desirable alternative.

SUMMARY

Two analyses were performed on the Wood County Project data to evaluate the economic benefit of its expanded resources to the community and to the individual recipient of services. The first analysis discussed measured the ratio of benefits (increased client lifetime earnings) to service costs. The second analysis focused on the reduction of public assistance expenditures to persons who received rehabilitation services.

Benefit-Cost Analysis

The first study used the technique of benefit-cost analysis which took into account only those benefits measured as increased lifetime earnings. Other benefits of vocational rehabilitation, such as psychological and emotional benefits to the rehabilitated person, were not considered. Calculation of benefits for the wage earners used average yearly earnings at acceptance and closure, multiplied by the individual's anticipated work-life (in years) to retirement age. These calculations were modified to take into consideration those persons already employed before acceptance and those who did not complete the program; they also included a rate of unemployment (five percent), a rate to allow for increased worker productivity (three percent), and a rate to allow for the probability of client death or disablement prior to reaching the age of retirement. Calculations of benefits for non-wage earners (homemakers and unpaid family workers) were based on mean earnings for a full-time maid.

Calculations of rehabilitation costs per client were based on the mean of direct service costs for each handicap group, adjusted to consider continuing administrative costs for a typical vocational rehabilitation agency. Costs were included for clients who failed to complete the program, but benefits for drop-outs were not included since they were too difficult to estimate with any degree of accuracy.

The results of the study showed the greatest increase in lifetime earnings per dollar invested for the culturally-handicapped group—70

to 1. Costs per client were also lower for this group. The 225 culturally-handicapped rehabilitants had an increase in projected lifetime earnings totaling over $10,000,000 from rehabilitation services costing less than $150,000 in public funds. The benefit-cost ratio for the culturally handicapped reflected the fact that the average medically-disabled rehabilitant was older, required greater expenditures for medically-related services, and had higher mortality and reinjury rates. In the principal control county, Eau Claire, there were fewer rehabilitants in the two-year period under study than in Wood County, but the general pattern was similar.

Reduction in Public Assistance Payments

The second analysis dealt with the relationship between the Project and a decrease in public assistance recipiency in the county. The average annual amount paid per typical client receiving some form of public assistance was estimated to be $1,421. Clients who were rehabilitated during the 1966-67 fiscal year and who had received public assistance at any time within three years prior to acceptance were identified by a search of the Wood County Department of Public Welfare records. This search revealed that those who had received public assistance were chronic recipients.

The results of the study revealed that 62% of the rehabilitated clients had been on public assistance. At the time of closure, only 5% continued to receive such support, resulting in a reduction of dollar amounts of public assistance of 91%. The payments for the culturally- and physically-handicapped groups, which had been the greatest financial burden to the community, had been decreased by 94% and 87% respectively. Payments for the emotionally disturbed were reduced by 95%, and there was an 89% reduction for the retarded.

The Wood County Project thus appears to have given an exceptionally high return per public investment dollar. In fact, the return for the cultural wage-earners was more than twice that of a typical client of vocational rehabilitation. In addition, all benefits cannot be included in an economic analysis. The total difference in a

person who becomes a wage earner instead of a welfare recipient is immeasurable. Too, the total economic impact on the community of having more money in circulation cannot be easily measured and was not computed in this analysis.

These analyses indicated that money spent to rehabilitate the culturally disadvantaged brings much greater—often immeasurable—benefits to the rehabilitants and to the community than for the clients whom the state-federal program has traditionally served.

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Appendix

THE WOOD COUNTY PROJECT BENEFIT-COST MODEL

BENEFITS

Model Variable	Source of Data	Quantity
Number in sample	Rehabilitants in WCP in 2-year period	Wood County–772 Eau Claire County–216
Annual average wage at closure	DVR-2 form	Varies by disability & sex
Annual average wage at acceptance	DVR-2 form	Varies by disability & sex
Number employed at acceptance	DVR-2 form	Wood County–151 Eau Claire County–18
Injury rate for normal population (Culturals)	Health Statistics, Series B 31	Range .93-3.85 by age & work status
Reinjury rate for new or recurrent disability (Medicals)	*An Exploratory Cost-Benefits Analysis,* HEW, VRA, 1967	Range 2.2-6.2 by age & work status
Mortality rate		
Culturals	1964 census rates	Range .1-3.6 by age & sex
Medicals	Above modified by mortality ratios of 1951 Impairment Study by Society of Actuaries	Range 2.01-1.28 by age
Remaining years in earnings stream after services	DVR-2 form	Age at closure + years to retirement age (if months in service less than 6, this will be same as below)

BENEFITS (continued)

Model Variable	Source of Data	Quantity
Remaining years in earnings stream before services	DVR-2 form	Age at acceptance + years to retirement age
Unemployment rates in research areas	Wis. Bureau of Labor Statistics	5.0%
Discount rate	*An Exploratory Cost-Benefits Analysis,* HEW, VRA, 1967	4.0%
Increased worker productivity at acceptance for wage earners at closure	*An Exploratory Cost-Benefits Analysis,* HEW, VRA, 1967	3.0%
Increased worker productivity at closure for wage earners at closure	*An Exploratory Cost-Benefits Analysis,* HEW, VRA, 1967	3.0%
Percent of clients unemployed at acceptance who were actually employable	*An Exploratory Cost-Benefits Analysis,* HEW, VRA, 1967	Varies by age group but not disability type
Number closed as wage earners	DVR-2 form	Varies by client categories
Number closed as housewives (N)	DVR-2 form	Varies by client categories
Number closed as unpaid family workers (N')	DVR-2 form	Varies by client categories
Value of work at closure for homemakers	*An Exploratory Cost-Benefits Analysis,* HEW, VRA, 1967	$1832 N
Value of work at closure for unpaid family workers	*An Exploratory Cost-Benefits Analysis,* HEW, VRA, 1967	$2883 N'

BENEFITS (continued)

Model Variable	Source of Data	Quantity
Assumed earnings at acceptance for non-wage earners	Ratios of earnings at acceptance to earnings at closure for wage earners in same client category	Range .19-.42 by disability type
Increased worker productivity at acceptance for non-wage earners	*An Exploratory Cost-Benefits Analysis,* HEW, VRA, 1967	3.0%
Increased worker productivity at closure for non-wage earners	*An Exploratory Cost-Benefits Analysis,* HEW, VRA, 1967	3.0%
Retirement age	*An Exploratory Cost-Benefits Analysis,* HEW, VRA, 1967	$\leq 54 = 62$ 55 - 64 = 65 $\geq 65 = 70$ > 70 = age + 1

COSTS

Model Variable	Source of Data	Quantity
Cost of case services	DVR-2 form	Average per client group
Cost of administration, salaries, and miscellaneous expenses	Wisconsin DVR records	18% of total program cost (case service cost divided by .82)
Cost of non-rehabilitants	DVR-2 form and calculation	Actual cost per client + administrative & other

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